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Jones

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(54) **VERTICAL AXIS WIND TURBINES**

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(72) Inventor: **Thomas Jones**, Santa Fe, TX (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **14/195,109**

(22) Filed: **Mar. 3, 2014**

Related U.S. Application Data

(63) Continuation-in-part of application No. 13/927,324, filed on Jun. 26, 2013, now Pat. No. 8,704,394, which is a continuation-in-part of application No. 13/222,629, filed on Aug. 31, 2011, now Pat. No. 8,497,592.

(51) **Int. Cl.**

F03D 9/02	(2006.01)
F03D 3/00	(2006.01)
F03D 9/00	(2006.01)
H02J 4/00	(2006.01)

(52) **U.S. Cl.**
CPC ***F03D 3/005*** (2013.01); ***F03D 9/003*** (2013.01); ***H02J 4/00*** (2013.01); *F05B 2240/211* (2013.01)

(58) **Field of Classification Search**
CPC F03D 9/00; F05B 2240/211
USPC 290/44, 55
See application file for complete search history.

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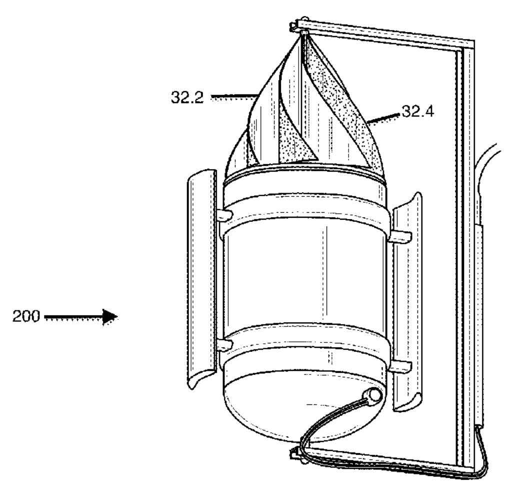
(57) **ABSTRACT**

A system is provided. The system includes a vertical axis wind turbine comprising a plurality of support arms, a housing coupled to the arms, a bridging connector having a first end portion and a second end portion, a blade coupled to the second end portion, and an electric generator housed within the housing. The first portion is coupled to the housing. The blade vertically extends along the housing. The generator operative based at least in part on the housing vertically rotating between the arms via the blade.

19 Claims, 21 Drawing Sheets



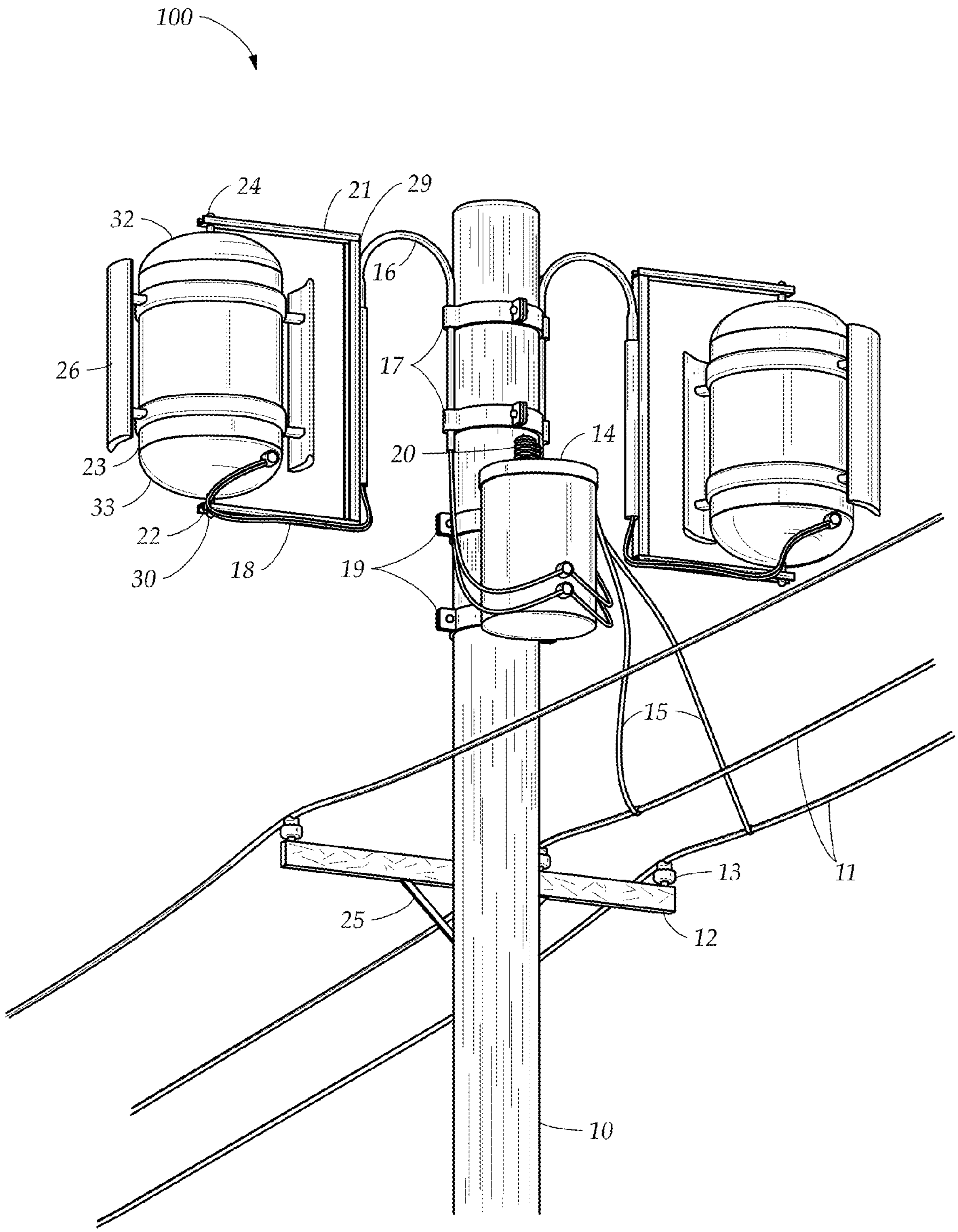


FIG. 1A

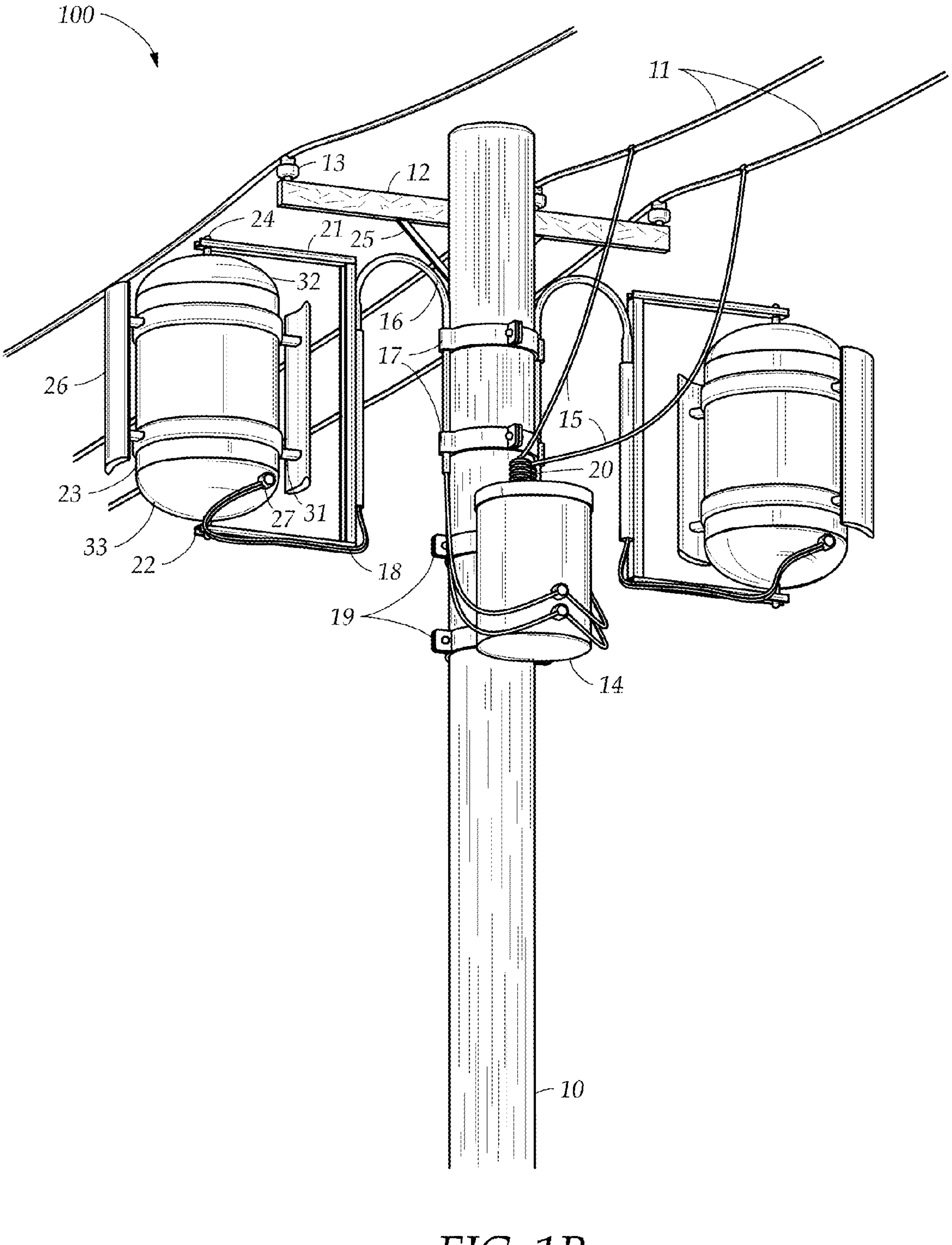


FIG. 1B

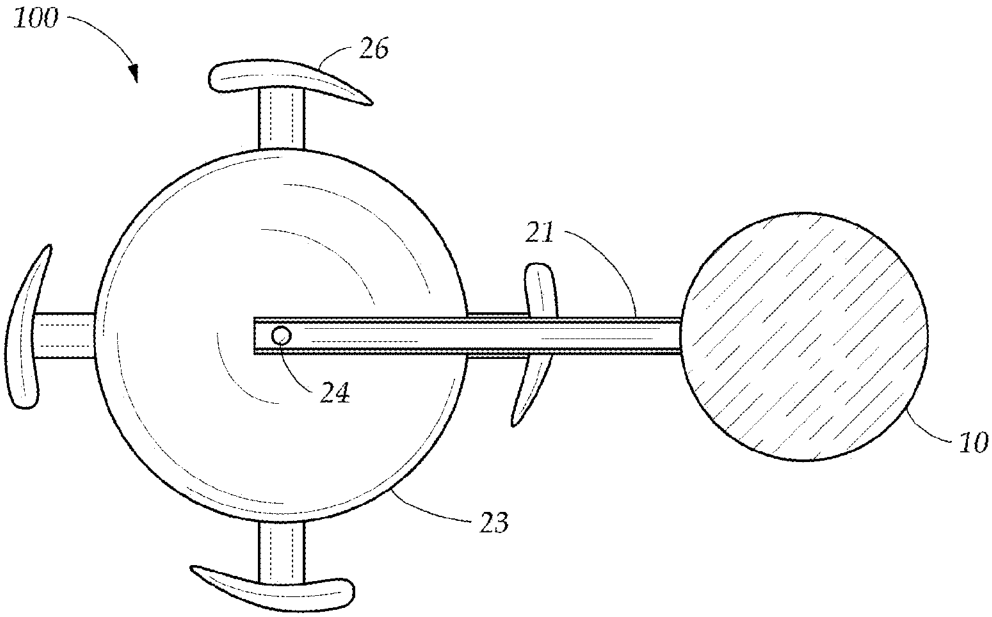


FIG. 2A

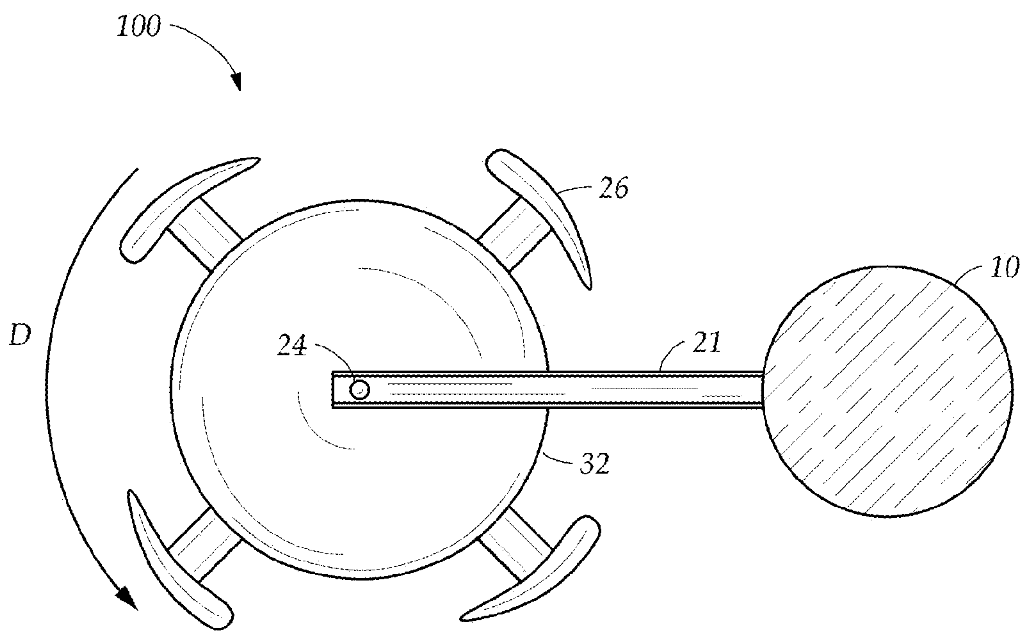


FIG. 2B

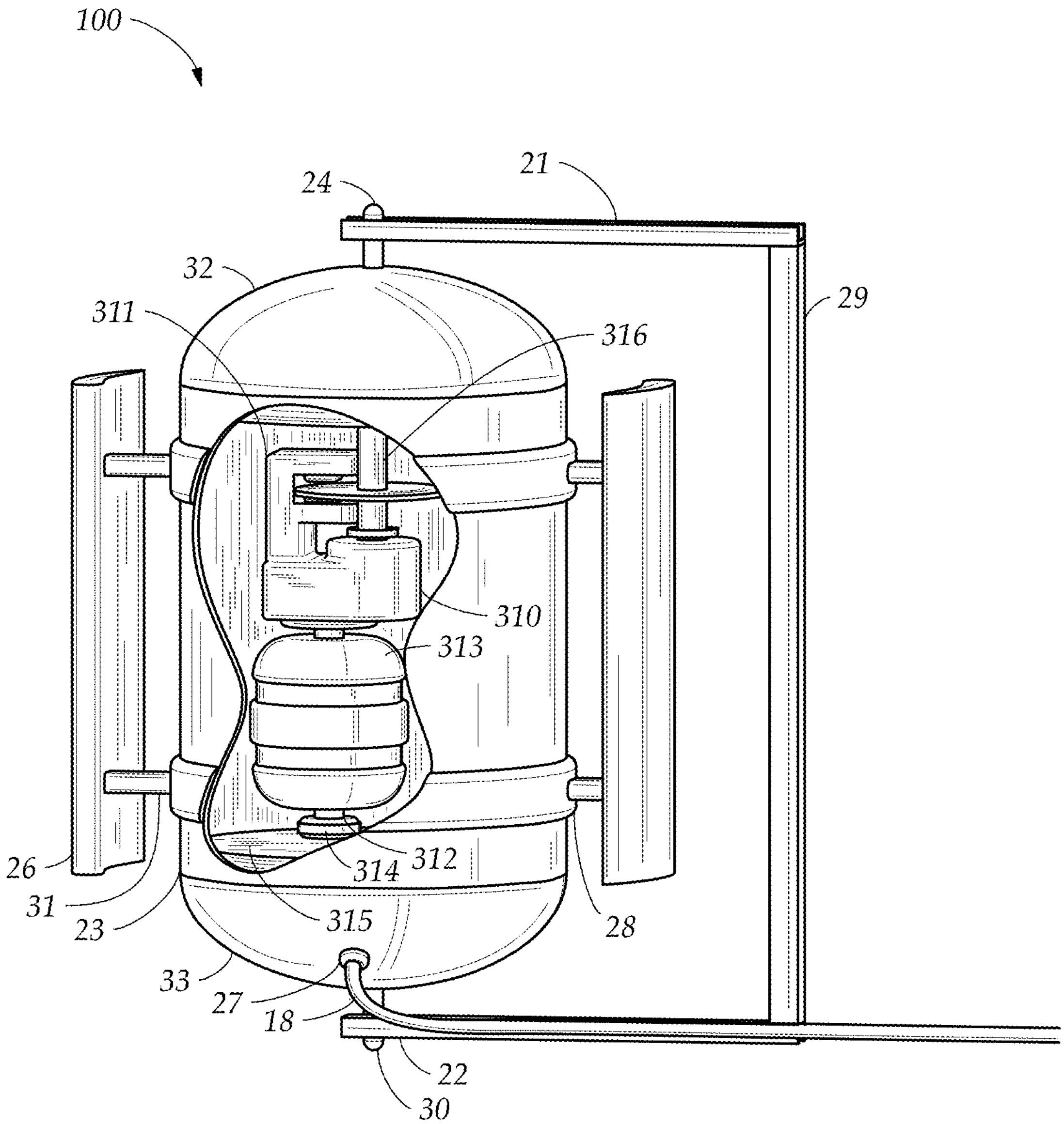

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FIG. 3

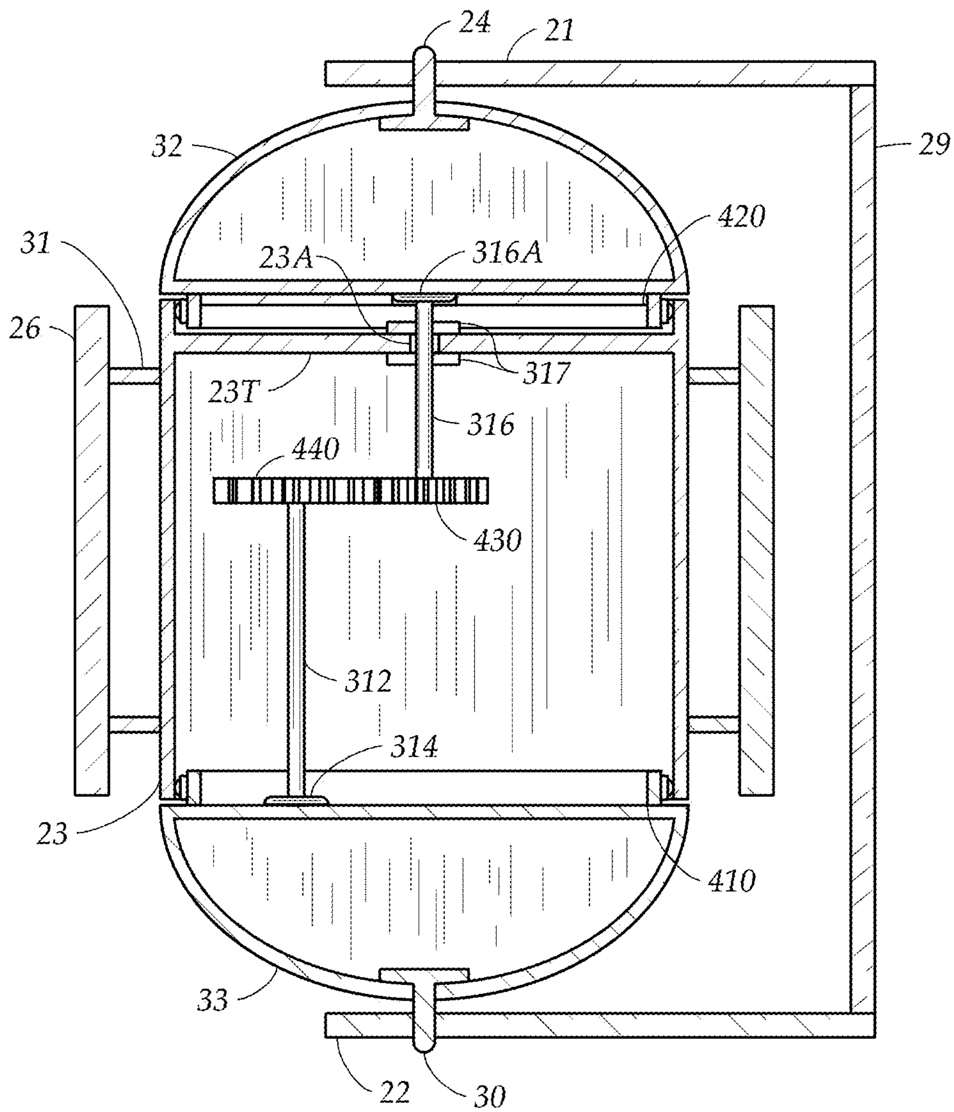
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FIG. 4

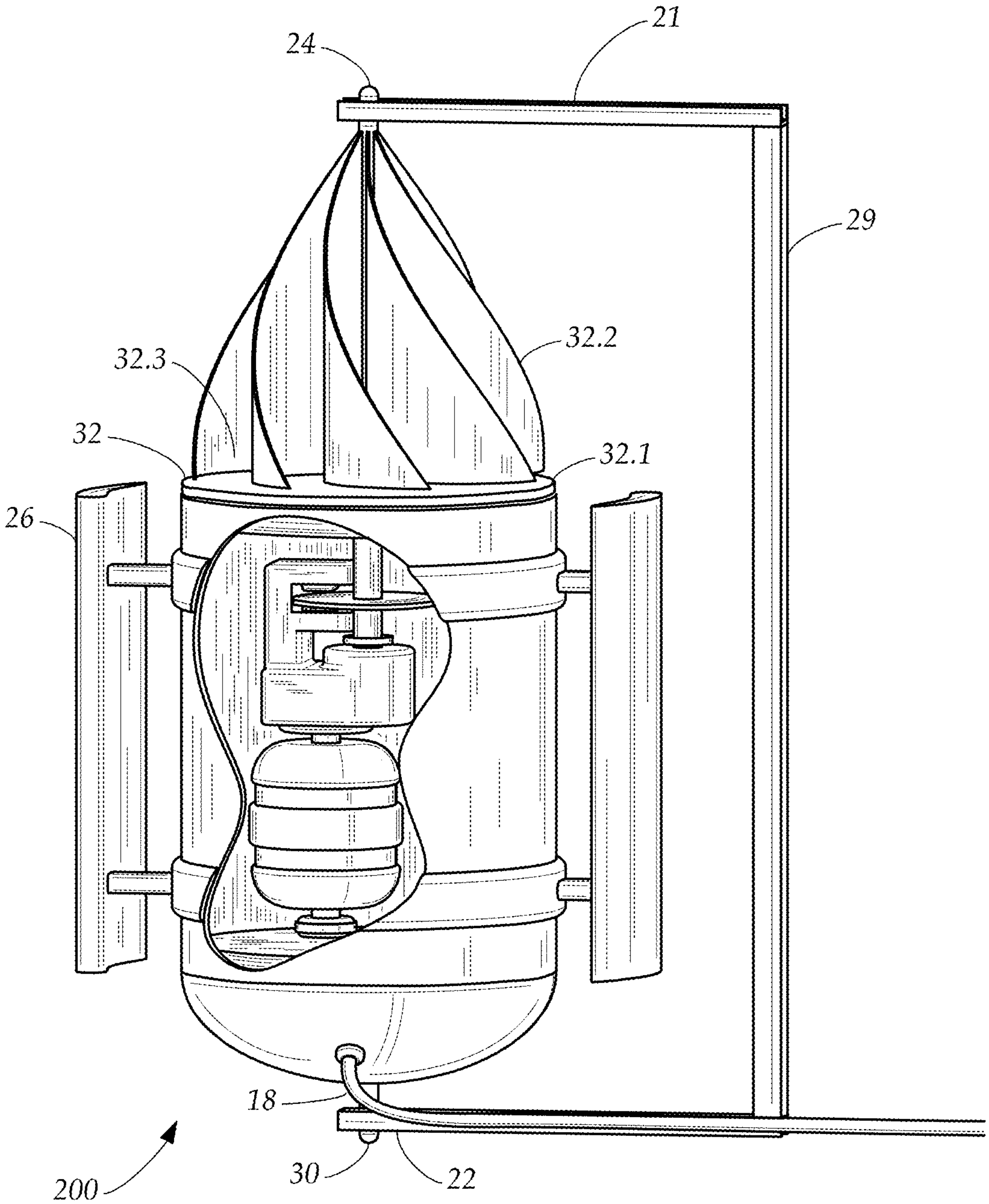

FIG. 5

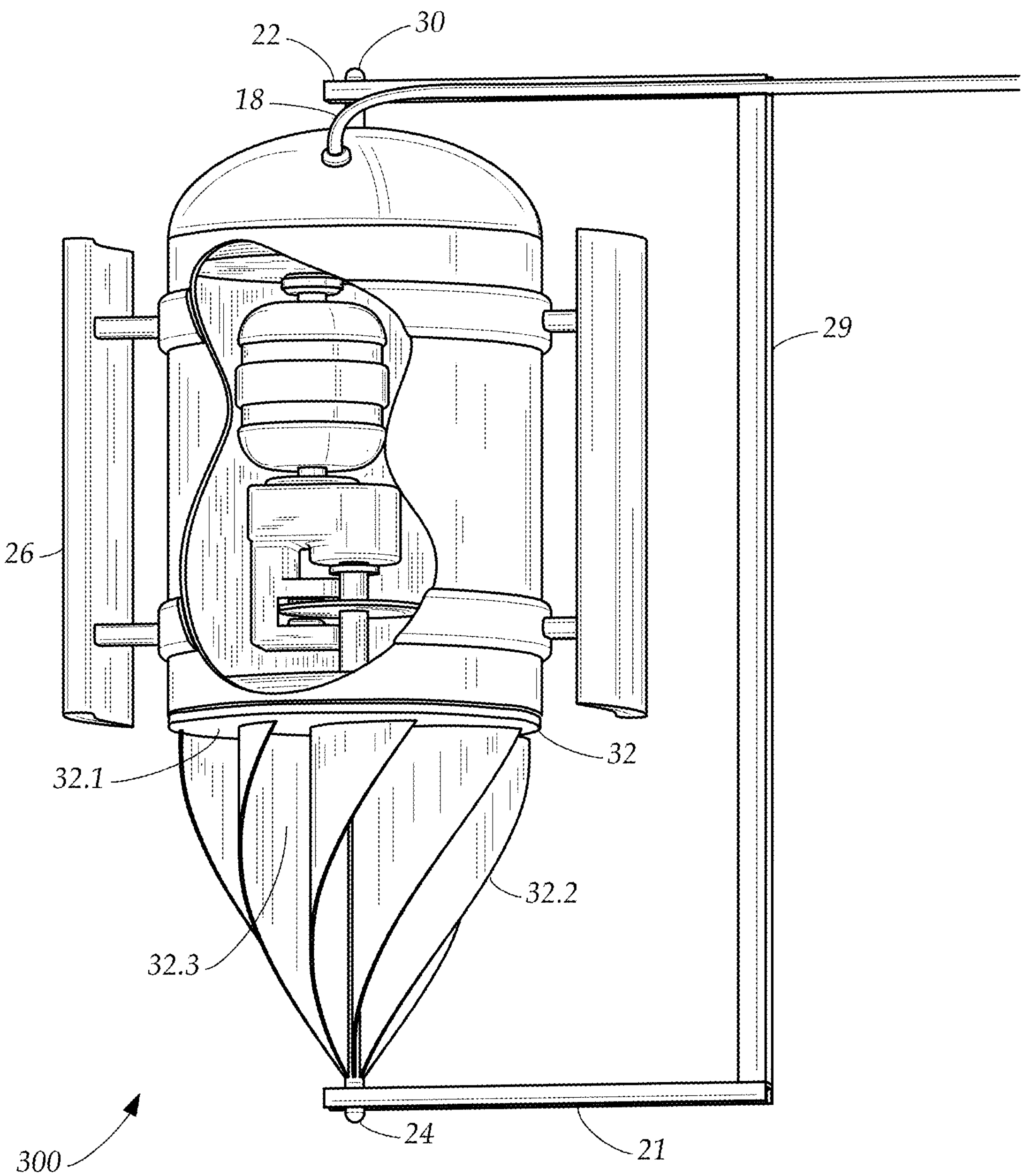

FIG. 6

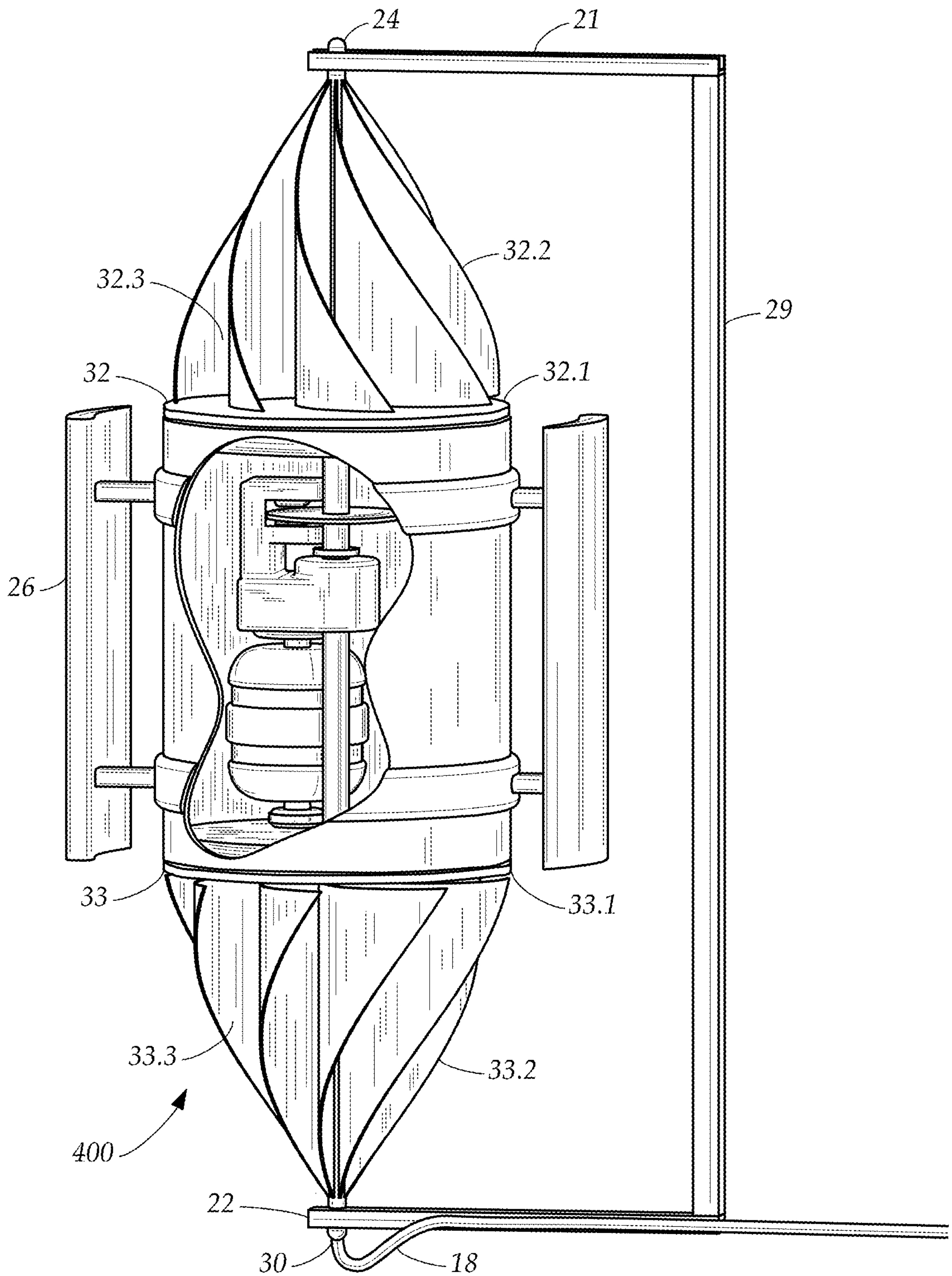

FIG. 7

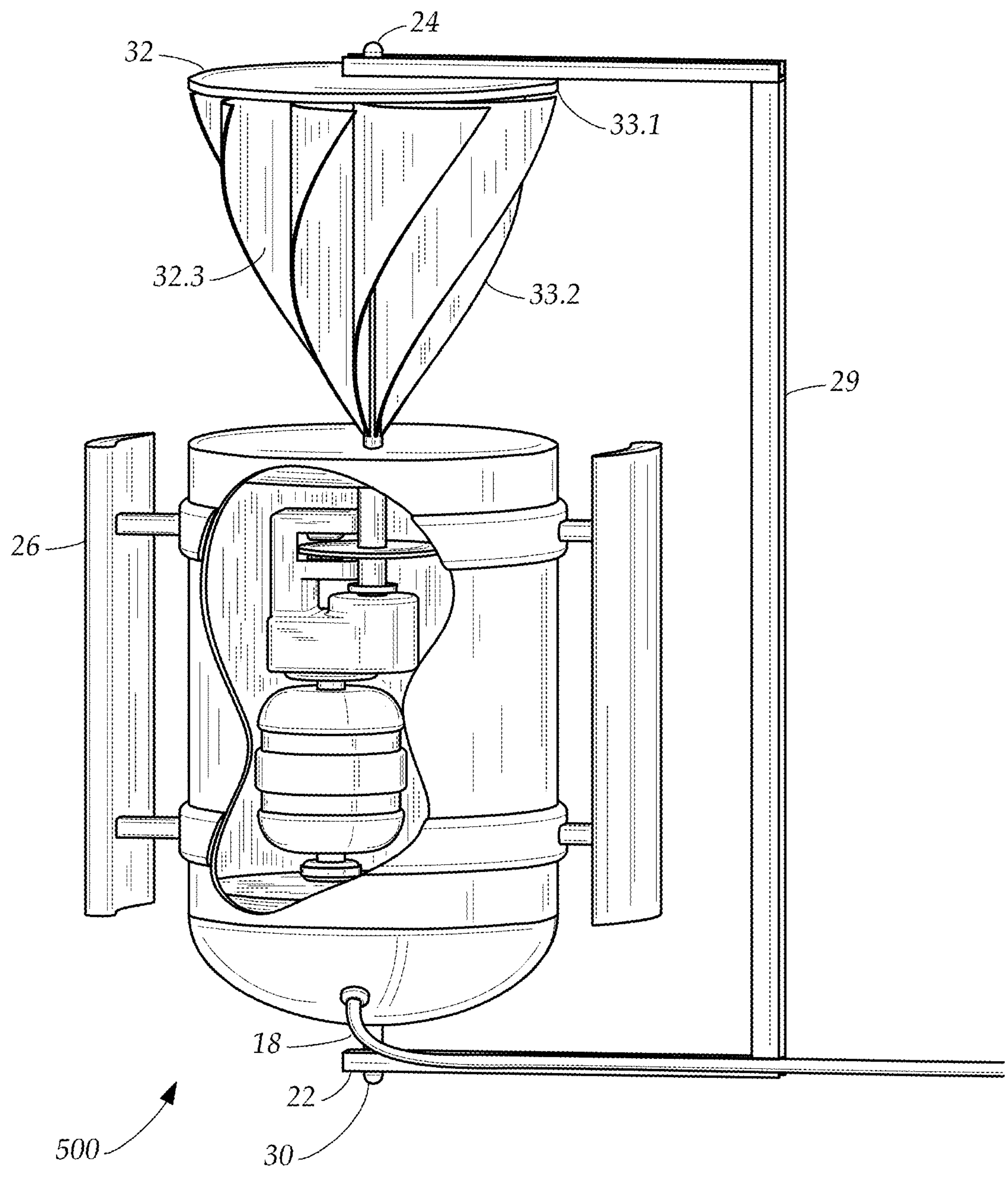

FIG. 8

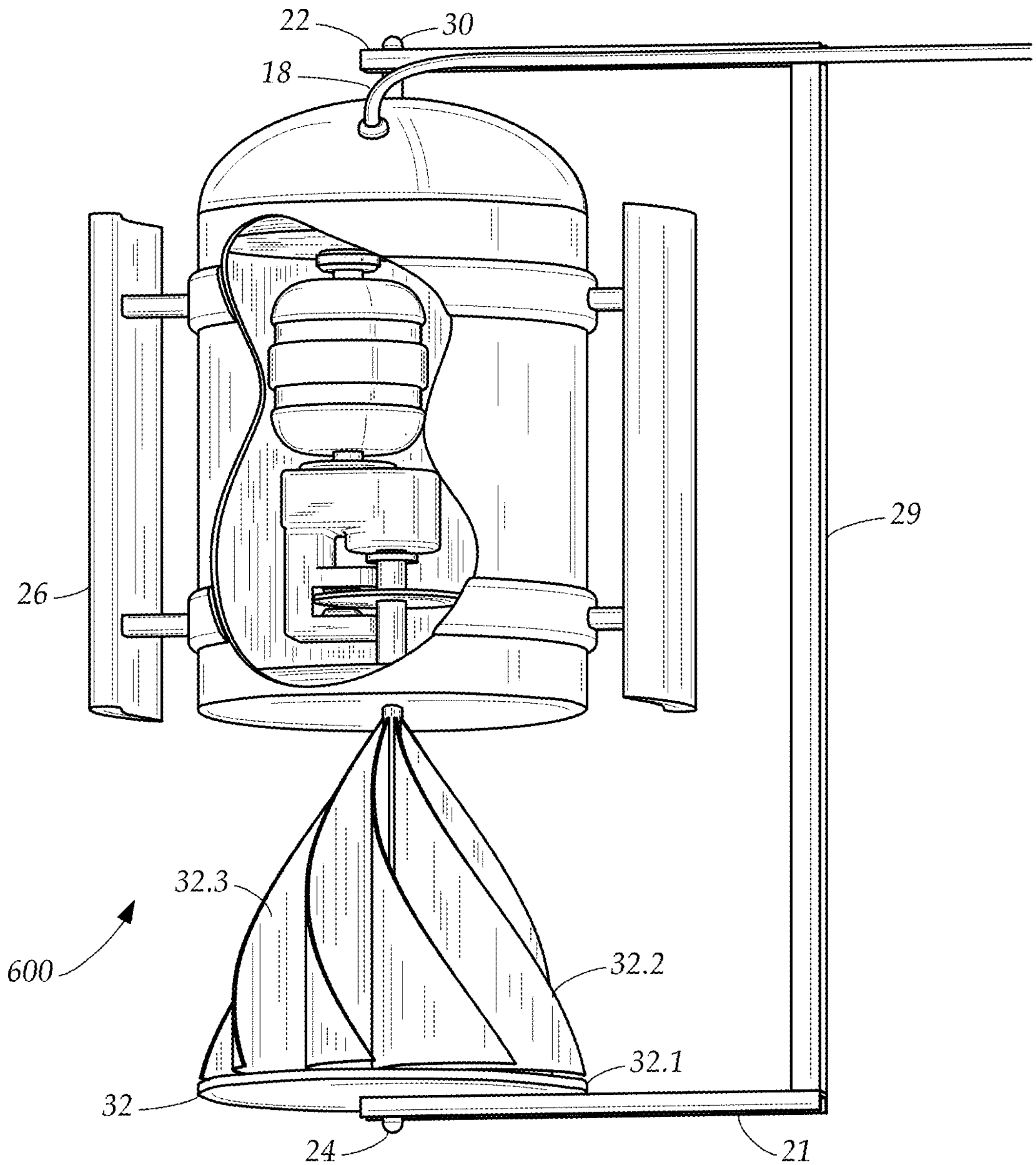

FIG. 9

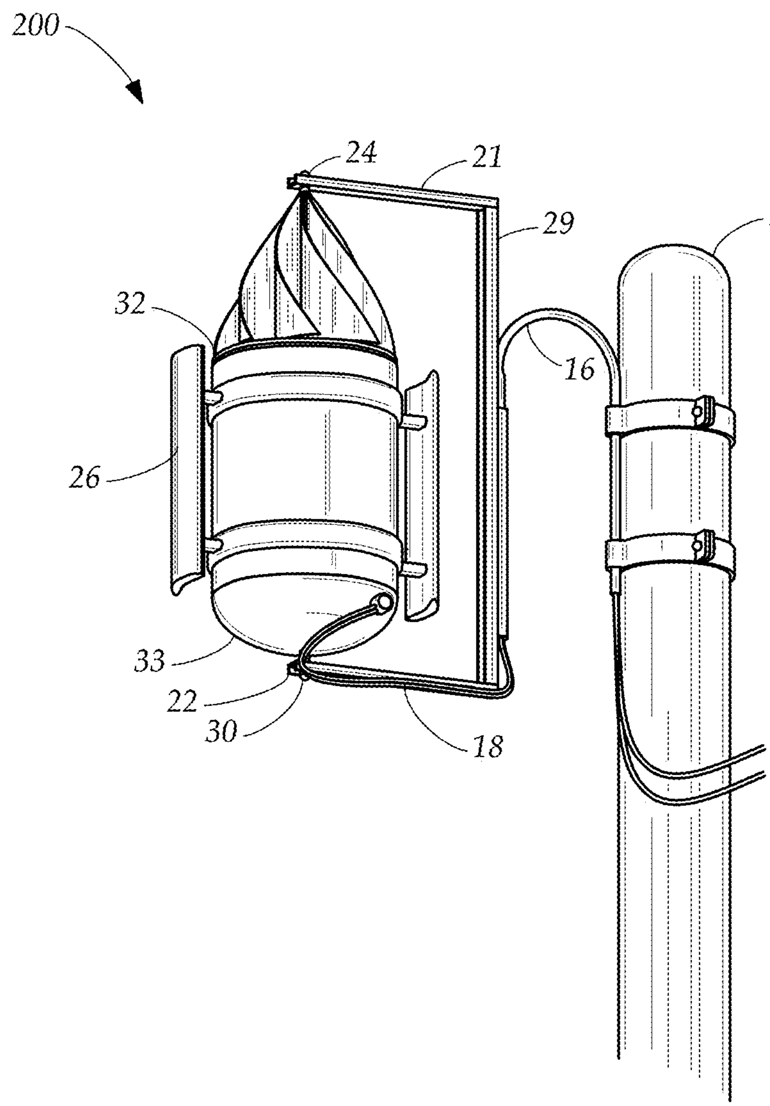

FIG. 10

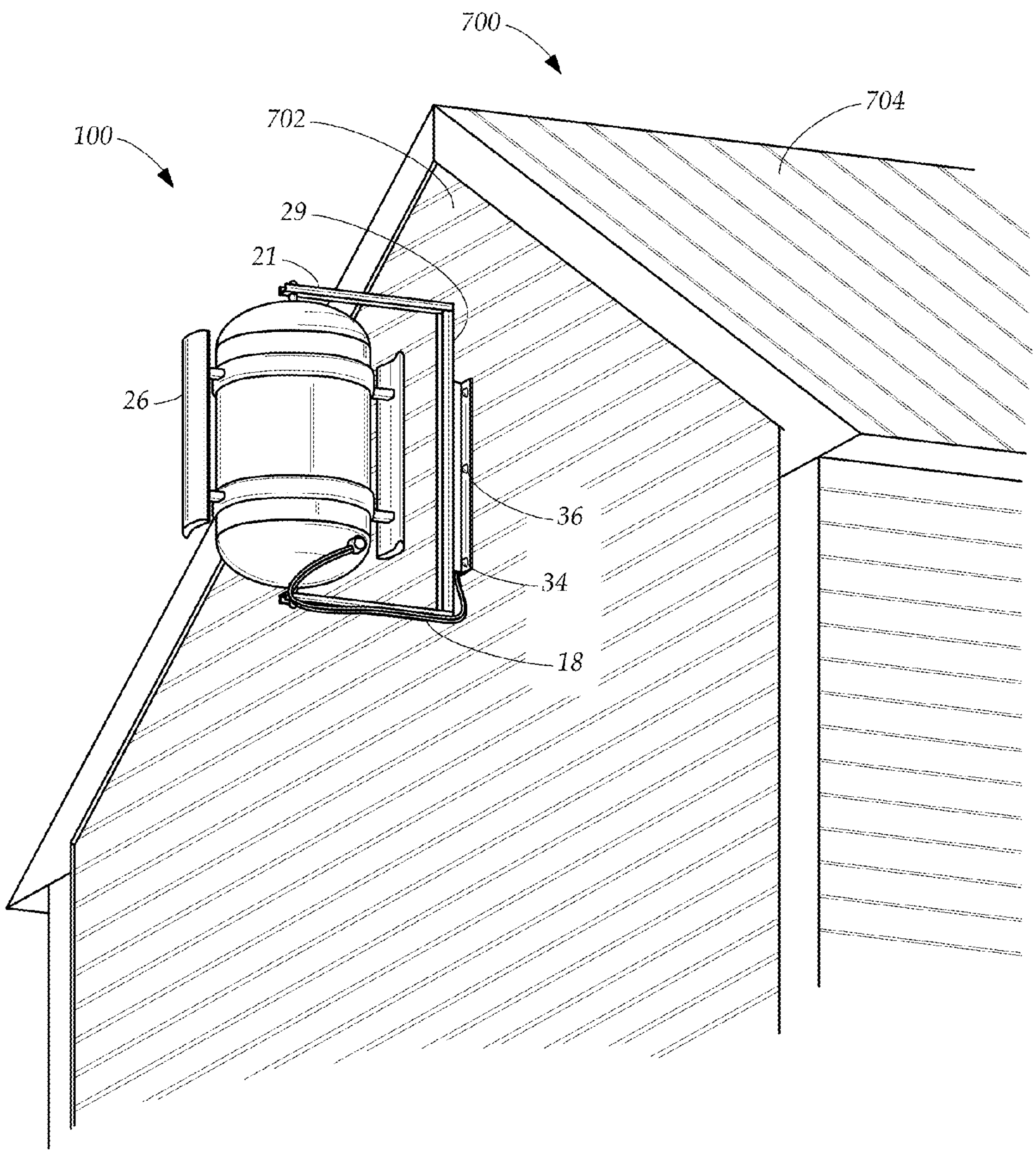

FIG. 11

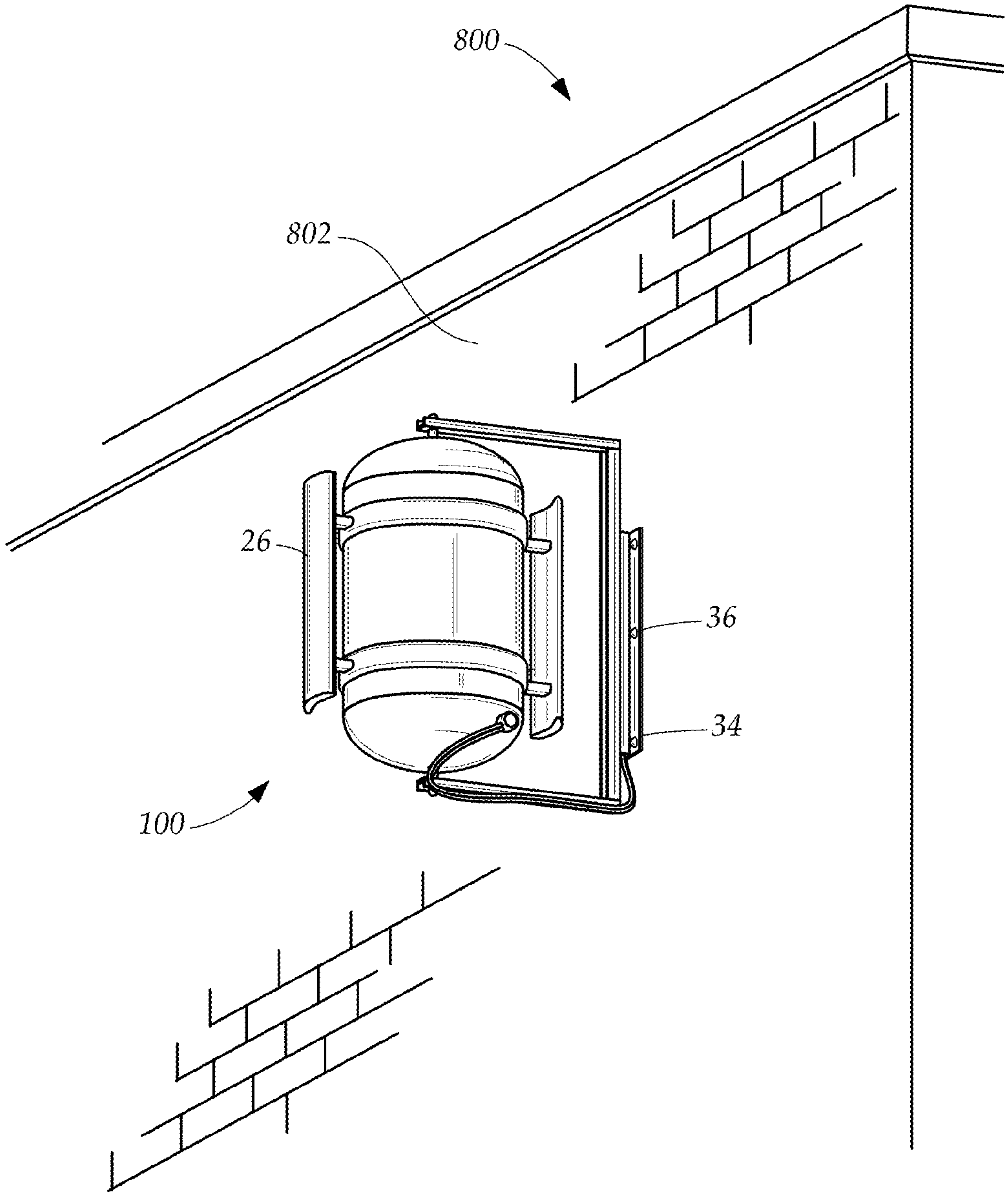

FIG. 12

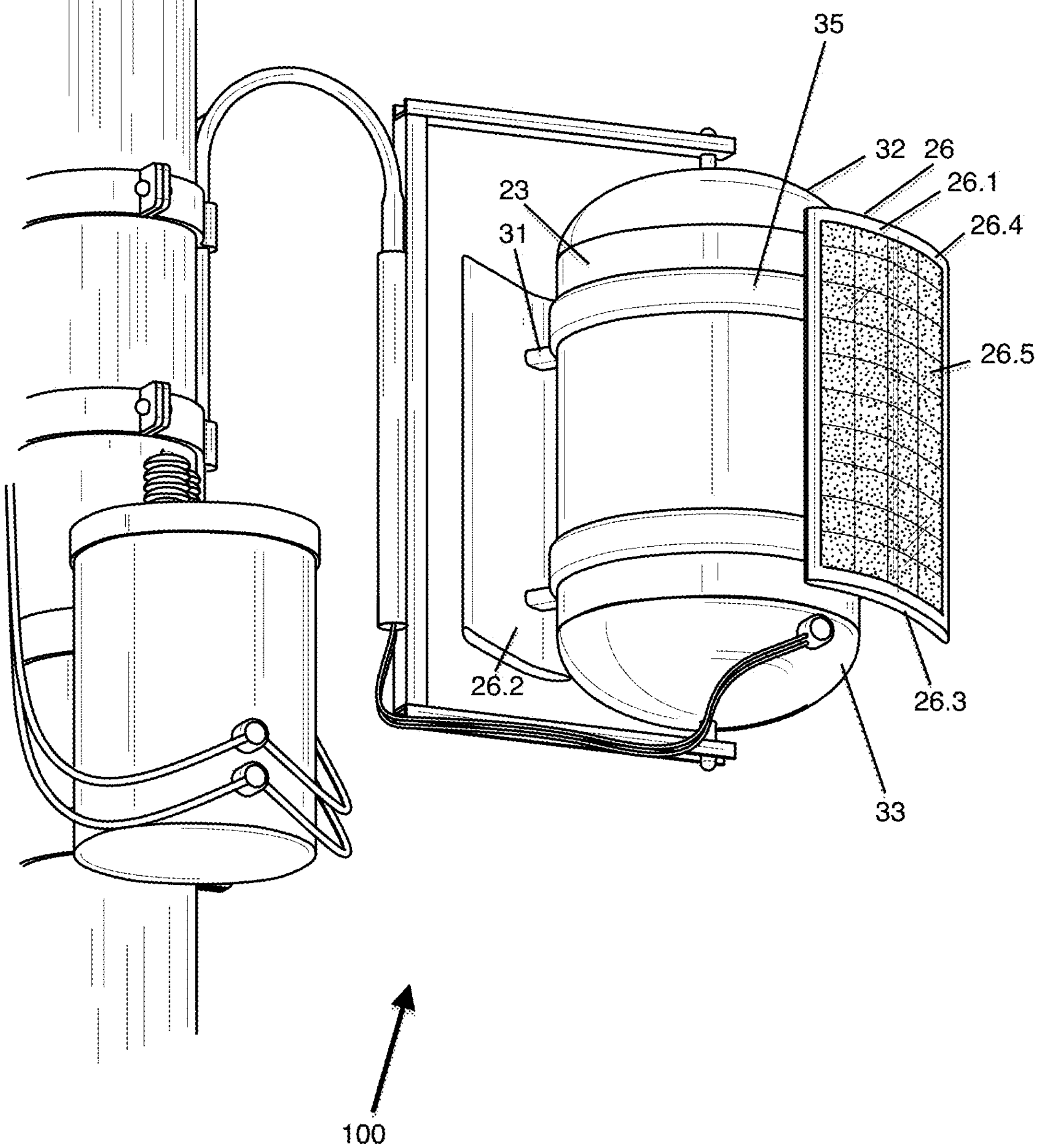

FIG. 13

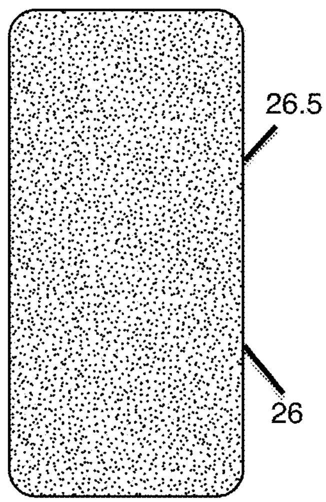

FIG. 14A

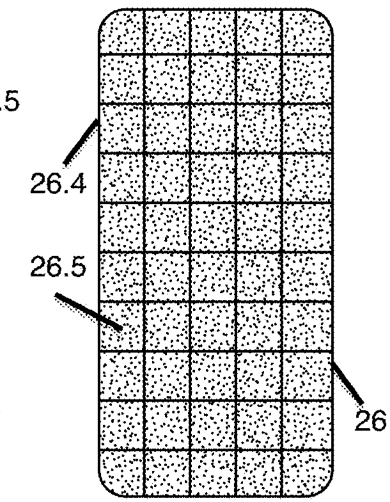

FIG. 14B

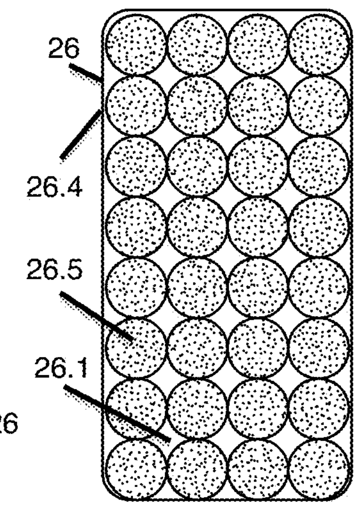

FIG. 14C

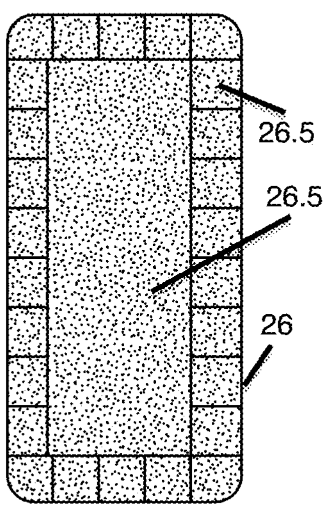

FIG. 14D

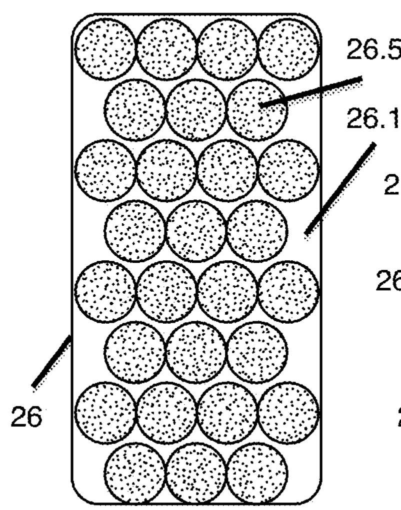

FIG. 14E

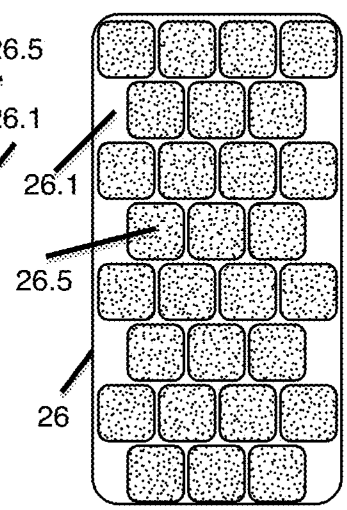

FIG. 14F

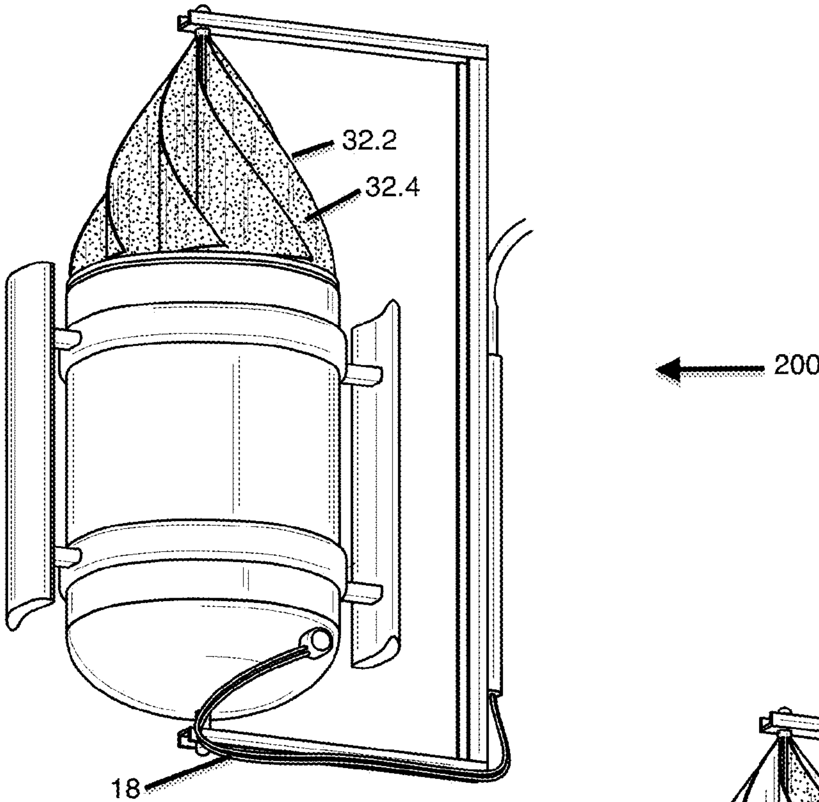

FIG. 15A

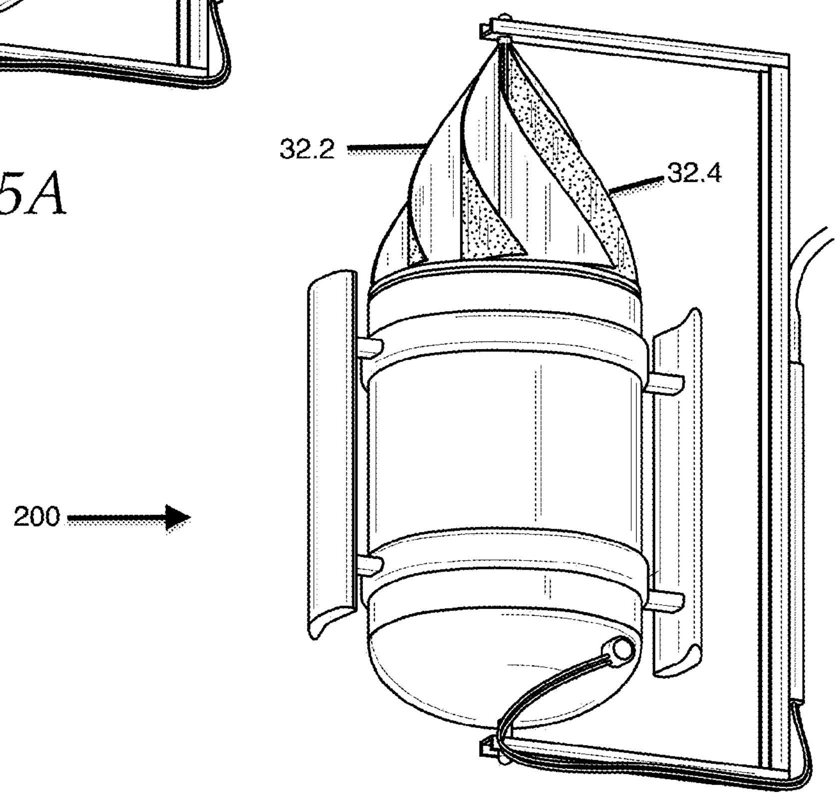

FIG. 15B

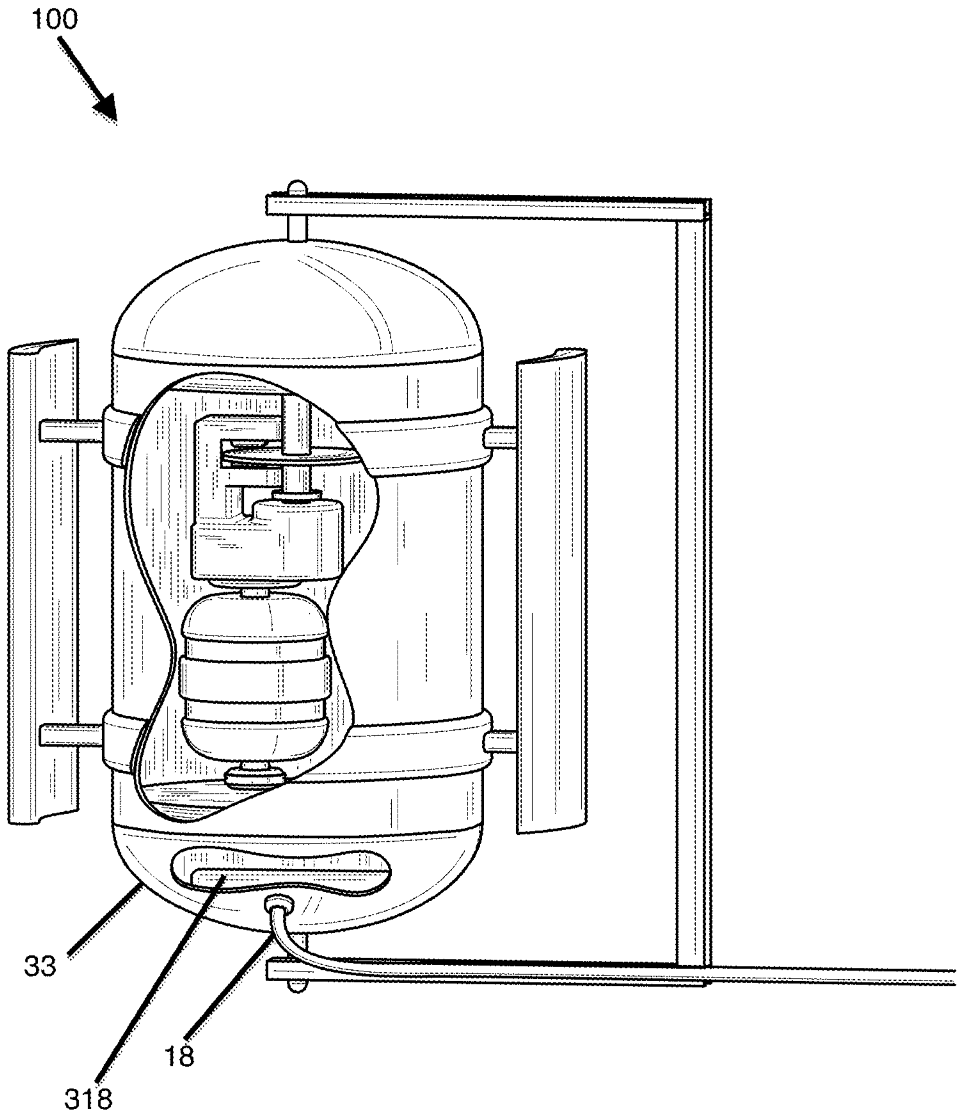

FIG. 16

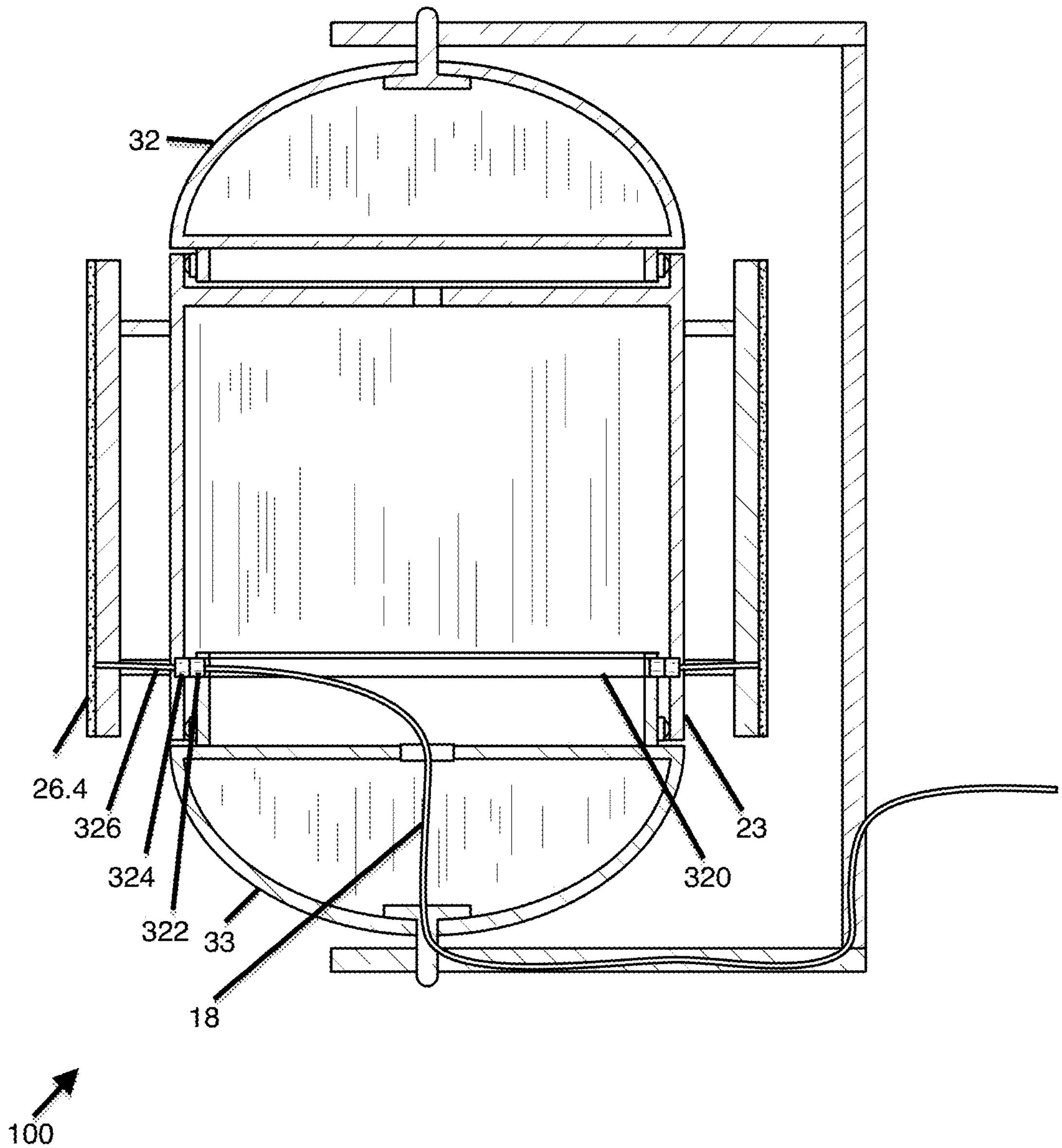

FIG. 17A

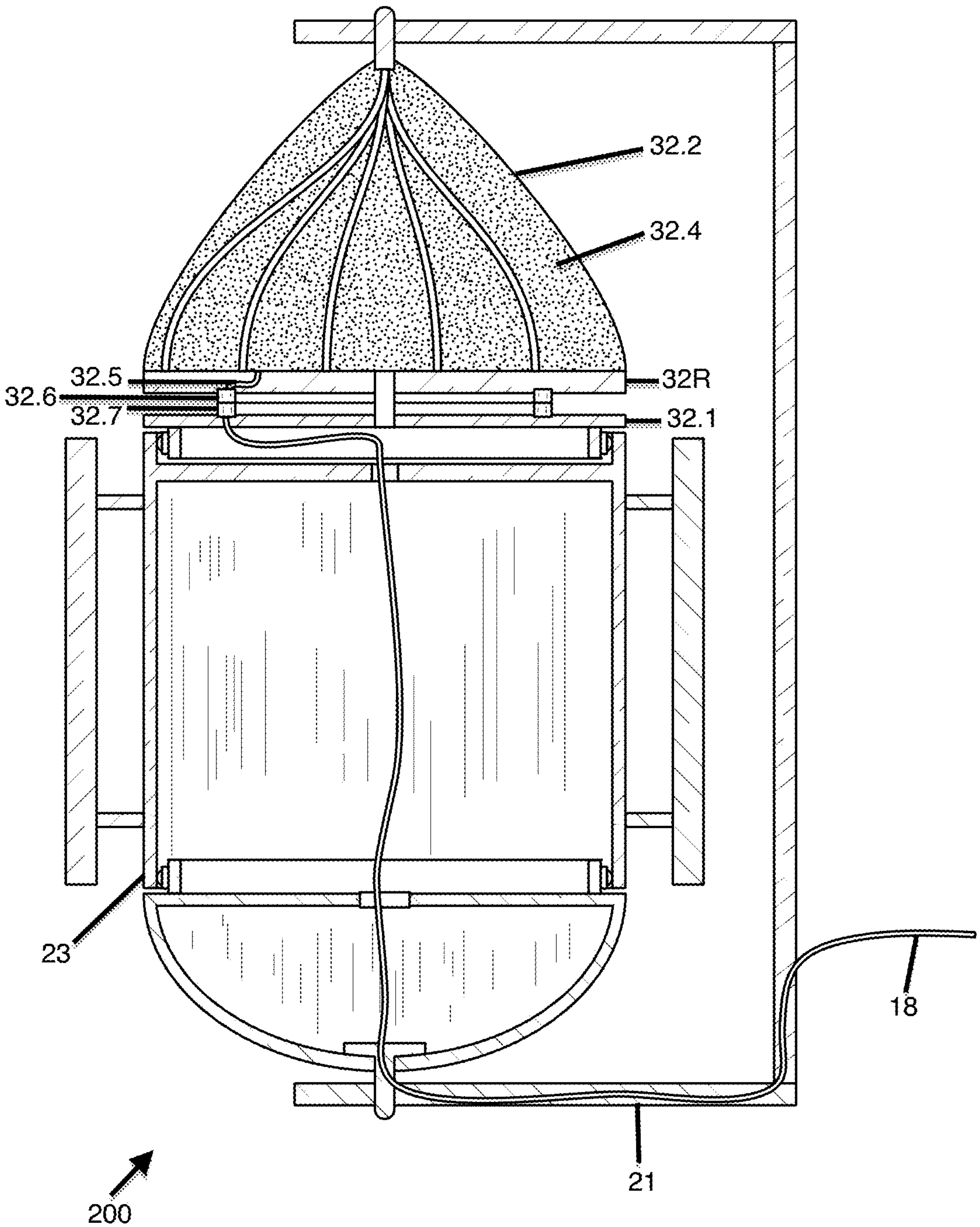

FIG. 17B

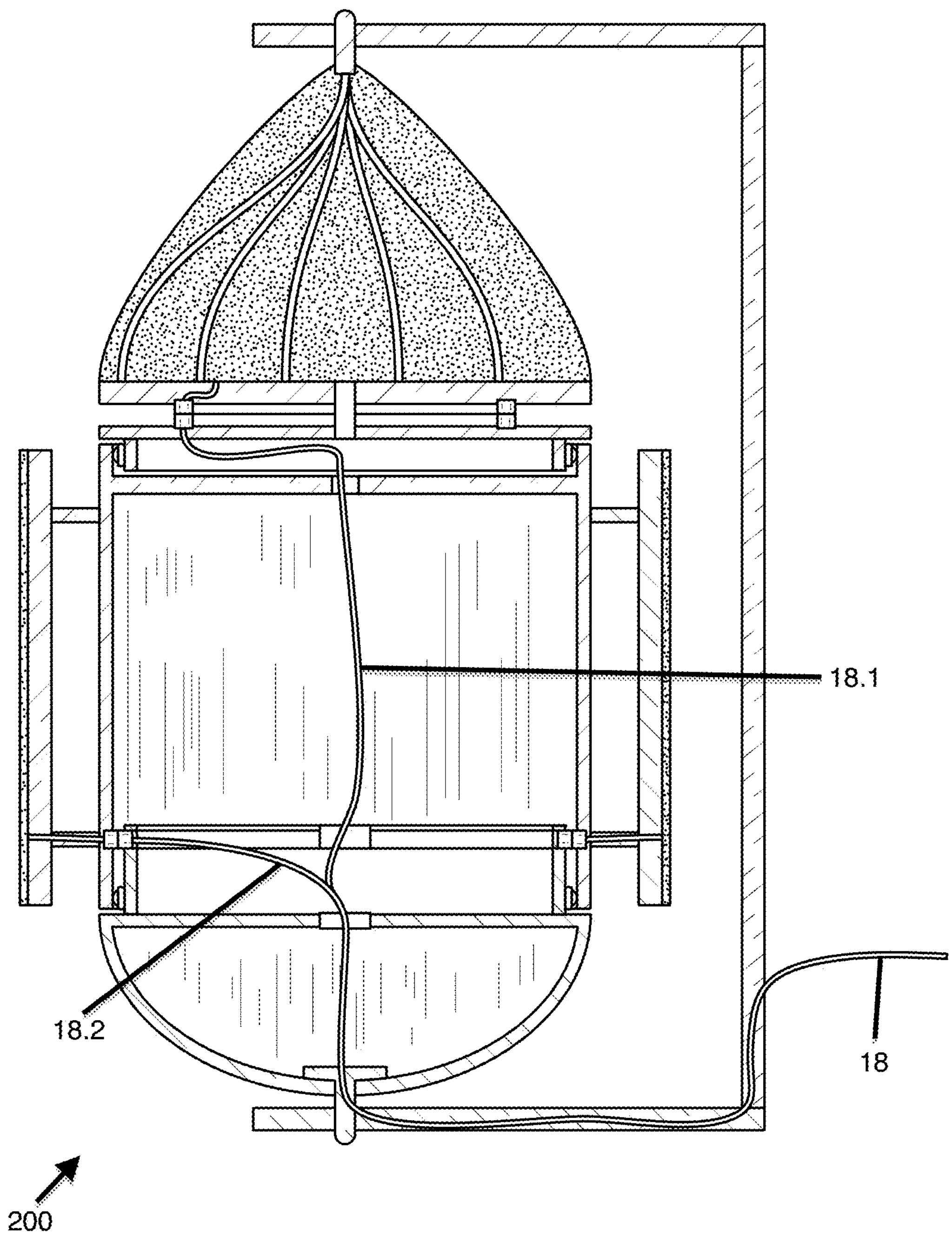

FIG. 17C

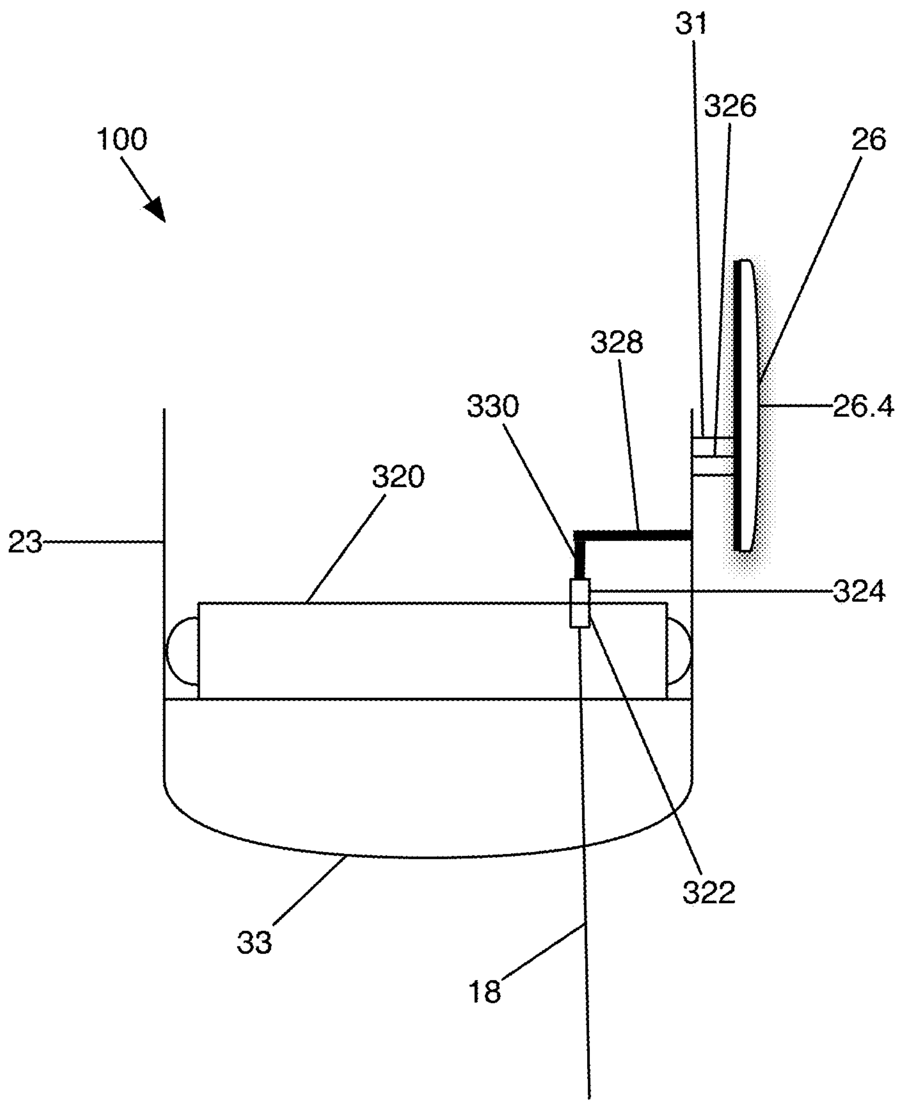

FIG. 18

VERTICAL AXIS WIND TURBINES

CROSS-REFERENCE TO RELATED APPLICATIONS

The present application is a continuation-in-part (CIP) of U.S. patent application Ser. No. 13/927,324, filed on Jun. 26, 2013, which in turn is a CIP of U.S. patent application Ser. No. 13/222,629, filed on Aug. 31, 2011. All of the above applications are herein fully incorporated by reference for all purposes.

TECHNICAL FIELD

Generally, the present disclosure relates to renewable energy. More particularly, the present disclosure relates to vertical axis wind turbines.

BACKGROUND

In the present disclosure, where a document, an act and/or an item of knowledge is referred to and/or discussed, whether directly and/or indirectly, then this reference and/or discussion is not an admission that the document, the act and/or the item of knowledge and/or any combination thereof was at the priority date, publicly available, known to the public, part of common general knowledge and/or otherwise constitutes prior art under the applicable statutory provisions and/or is known to be relevant to an attempt to solve any problem with which the present disclosure is concerned.

Identification of new non-fossil fuel based energy sources, which are both commercially viable and/or environmentally benign, has become an important national security and/or technological need. With increasing domestic energy consumption, such technological development not only enhances national security, reduces visual pollution, fuels economic growth, creates jobs and/or contributes to global environmental sustainability, but also reduces foreign energy dependence.

Many countries and/or businesses often commit to make better use of renewable and/or nonpolluting energy sources. Wind energy is a popular source explored by many not just because wind energy is renewable and/or nonpolluting, but also because wind energy is free. Although wind farms with acres of large wind turbines have proved relatively successful, such wind farms are relatively rare and/or generally involve substantial economic investment, visual pollution and/or contentious land use issues. A broader, simpler, more visually appealing and/or geographically universal wind turbine construction and/or management approach may be required to bring wind energy to its full potential.

Also, in United States, utility poles are ubiquitous and/or often include power transmission capabilities. In fact, miles of open roads, spreading through wide-open spaces, are lined with a seemingly endless amount of utility poles. A significant amount of wind energy, which often encounters these poles, remains underutilized. Thus, by better utilizing already existing utility poles for wind energy generation, increasing domestic energy consumption can be more effectively managed without substantial economic investment.

Additionally, some electric utility companies, such as electric distribution cooperatives, do not generate electric power. Rather, these companies purchase electricity from another entity. Thus, these companies are caught in the middle of a vibrant energy supply and/or demand market and, generally, do not have control over rising energy costs. Similarly, these companies also often face arbitrary political mandates and/or unreasonable customer demands for prompt provision of renewable energy without having any control over how to provide such energy.

Accordingly, there may be a need to more efficiently create and distribute renewable energy, decrease dependency on centralized electric energy generation, lessen fossil fuel use in electricity generation, minimize foreign energy dependence, reduce the price of electricity, create a new renewable energy business model, while implementing a job creating solution using an already existing infrastructure.

While certain aspects of conventional technologies have been discussed to facilitate the present disclosure, no technical aspects are disclaimed. The claims may encompass one and/or more of the conventional technical aspects discussed herein.

BRIEF SUMMARY

According to an example embodiment of the present disclosure a system is provided. The system includes a vertical axis wind turbine comprising a plurality of support arms, a housing coupled to the arms, a bridging connector having a first end portion and a second end portion, a blade coupled to the second end portion, and an electric generator housed within the housing. The first portion is coupled to the housing. The blade vertically extends along the housing. The generator operative based at least in part on the housing vertically rotating between the arms via the blade.

According to an example embodiment of the present disclosure a system is provided. The system includes a vertical axis wind turbine comprising a plurality of support arms, a housing coupled to the arms, a band extending around the housing, a blade coupled to the band, and an electric generator housed within the housing. The generator is operative based at least in part on the band and the blade vertically rotating between the arms. At least one of the housing, the band, and the blade including a photovoltaic cell.

According to an example embodiment of the present disclosure a system is provided. The system includes a vertical axis wind turbine comprising a base and a rotor. The base including a first magnet and a first electrode. The rotor including a second magnet and a second electrode. The rotor including a plurality of vertically spiraling foils. The rotor is positioned adjacent to the base such that the first magnet is disposed adjacent to the second magnet thereby causing the rotor to be rotatingly suspended above the base. At least one of the foils includes at least one photovoltaic cell. The first electrode receiving energy from the at least one cell via the second electrode traveling along the first electrode the said rotor.

The present disclosure may be embodied in the form illustrated in the accompanying drawings. Attention is called to the fact, however, that the drawings are illustrative. Variations are contemplated as being part of the present disclosure, limited only by the scope of the claims.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings illustrate example embodiments of the present disclosure. Such drawings are not to be construed as necessarily limiting the present disclosure. Like numbers and/or similar numbering scheme can refer to like and/or similar elements throughout.

FIG. **1**A illustrates an example mode of operation of a vertical axis wind turbine according to the present disclosure.

FIG. **1**B illustrates another example mode of operation of a vertical axis wind turbine according to the present disclosure.

FIGS. **2**A and **2**B illustrate a top view of an example embodiment of a vertical axis wind turbine in operation according to the present disclosure.

FIG. **3** illustrates an internal perspective view of an example embodiment of a vertical axis wind turbine according to the present disclosure.

FIG. **4** illustrates a side view of an example embodiment of a vertical axis wind turbine according to the present disclosure.

FIG. **5** illustrates a perspective view of an example embodiment of a vertical axis wind turbine having a top vertical axis wind turbine according to the present disclosure.

FIG. **6** illustrates a perspective view of an example embodiment of a vertical axis wind turbine having a bottom vertical axis wind turbine according to the present disclosure.

FIG. **7** illustrates a perspective view of an example embodiment of a vertical axis wind turbine having a plurality of vertical axis wind turbines according to the present disclosure.

FIG. **8** illustrates a perspective view of an example embodiment of a vertical axis wind turbine having an inverted top vertical axis wind turbine according to the present disclosure.

FIG. **9** illustrates a perspective view of an example embodiment of a vertical axis wind turbine having an inverted bottom vertical axis wind turbine according to the present disclosure.

FIG. **10** illustrates a perspective view of an example embodiment of a vertical axis wind turbine having a top vertical axis wind turbine coupled to a utility pole according to the present disclosure.

FIG. **11** illustrates an example mode of operation of a vertical axis wind turbine according to the present disclosure.

FIG. **12** illustrates an example mode of operation of a vertical axis wind turbine according to the present disclosure.

FIG. **13** illustrates a perspective view of an example embodiment of a vertical axis wind turbine equipped with a photovoltaic cell array on a blade according to the present disclosure.

FIG. **14**A illustrates a frontal view of an example embodiment of a photovoltaic cell on a vertical axis wind turbine blade according to the present disclosure.

FIG. **14**B illustrates a frontal view of an example embodiment of a photovoltaic cell array on a vertical axis wind turbine blade according to the present disclosure.

FIG. **14**C illustrates a frontal view of another example embodiment of a photovoltaic cell array on a vertical axis wind turbine blade according to the present disclosure.

FIG. **14**D illustrates a frontal view of an example embodiment of a photovoltaic cell enclosed via a set of photovoltaic cells arranged in a rectangular pattern on a vertical axis wind turbine blade according to the present disclosure.

FIG. **14**E illustrates a frontal view of an example embodiment of a set of photovoltaic cells arranged in a numerically alternating pattern on a vertical axis wind turbine blade according to the present disclosure.

FIG. **14**F illustrates a frontal view of another example embodiment of a set of photovoltaic cells arranged in a numerically alternating pattern on a vertical axis wind turbine blade according to the present disclosure.

FIG. **15**A illustrates a perspective view of an example embodiment of a first vertical axis wind turbine coupled to a second vertical axis wind turbine with a plurality of sequential photovoltaic foils according to the present disclosure.

FIG. **15**B illustrates a perspective view of an example embodiment of a first vertical axis wind turbine coupled to a second vertical axis wind turbine with a plurality of alternating photovoltaic foils according to the present disclosure.

FIG. **16** illustrates a perspective of an example embodiment of a vertical axis wind turbine containing a power storage device for storing generated energy according to the present disclosure.

FIG. **17**A illustrates a schematic view of an example embodiment of a photovoltaic current conduction system according to the present disclosure.

FIG. **17**B illustrates a schematic view of another example embodiment of a photovoltaic current conduction system according to the present disclosure.

FIG. **17**C illustrates a schematic view of yet another example embodiment of a photovoltaic current conduction system according to the present disclosure.

FIG. **18** illustrates a schematic view of still another example embodiment of a photovoltaic current conduction system according to the present disclosure.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The present disclosure is now described more fully with reference to the accompanying drawings, in which example embodiments of the present disclosure are shown. The present disclosure may, however, be embodied in many different forms and should not be construed as necessarily being limited to the example embodiments set forth herein. Rather, these example embodiments are provided so that the disclosure is thorough and complete, and fully conveys the concepts of the present disclosure to those skilled in the art. In addition, features described with respect to certain example embodiments may be combined in and/or with various other example embodiments. For example, the disclosed embodiments may individually and/or collectively be components of a larger system, wherein other procedures may take precedence over or otherwise modify their application and/or operation. In addition, a number of steps may be required before, after, or concurrently with the following embodiments. Different aspects and/or elements of the example embodiments may be combined in a similar manner.

The terminology used herein can imply direct or indirect, full or partial, action or inaction. For example, when an element is referred to as being “on,” “connected” or “coupled” to another element, then the element can be directly connected or coupled to the other element and/or intervening elements may be present. In contrast, when an element is referred to as being “directly connected” or “directly coupled” to another element, there are no intervening elements present.

Although the terms first, second, etc. may be used herein to describe various elements, components, regions, layers and/or sections, these elements, components, regions, layers and/or sections should not necessarily be limited by such terms. These terms are only used to distinguish one element, component, region, layer or section from another element, component, region, layer or section. Thus, a first element, component, region, layer, or section discussed below could be termed a second element, component, region, layer, or section without departing from the teachings of the present disclosure.

The terminology used herein is for describing particular embodiments only and is not intended to be necessarily limiting of the disclosure. As used herein, the singular forms “a,” “an” and “the” are intended to include the plural forms as well, unless the context clearly indicates otherwise. The terms “comprises,” “includes” and/or “comprising,” “including” when used in this specification, specify the presence of stated features, integers, steps, operations, elements, and/or components, but do not preclude the presence or addition of one or more other features, integers, steps, operations, elements, components, and/or groups thereof.

Example embodiments of the present disclosure are described herein with reference to illustrations of idealized embodiments (and intermediate structures) of the present disclosure. As such, variations from the shapes of the illustrations as a result, for example, of manufacturing techniques and/or tolerances, are to be expected. Thus, the example embodiments of the present disclosure should not be construed as necessarily limited to the particular shapes of regions illustrated herein, but are to include deviations in shapes that result, for example, from manufacturing.

Any and/or all elements, as disclosed herein, can be formed from a same, structurally continuous piece, such as being unitary, and/or be separately manufactured and/or connected, such as being an assembly and/or modules. Any and/or all elements, as disclosed herein, can be manufactured via any manufacturing processes, whether additive manufacturing, subtractive manufacturing, and/or other any other types of manufacturing. For example, some manufacturing processes can include three-dimensional (3D) printing, laser cutting, computer numerical control (CNC) routing, milling, pressing, stamping, vacuum forming, hydroforming, injection molding, lithography, and/or others.

Any and/or all elements, as disclosed herein, can include, whether partially and/or fully, a solid, including a metal, a mineral, a ceramic, a glass ceramic, an organic solid, such as wood and/or a polymer, such as rubber, a composite material, a semiconductor, a nanomaterial, a biomaterial and/or any combinations thereof. Any and/or all elements, as disclosed herein, can include, whether partially and/or fully, a coating, including an informational coating, such as ink, an adhesive coating, a melt-adhesive coating, such as vacuum seal and/or heat seal, a release coating, such as tape liner, a low surface energy coating, an optical coating, such as for tint, color, hue, saturation, tone, shade, transparency, translucency, non-transparency, anti-reflection and/or holographic, a photo-sensitive coating, an electronic and/or thermal property coating, such as for passivity, insulation, resistance or conduction, a magnetic coating, a water-resistant and/or waterproof coating, a scent coating and/or any combinations thereof. Any and/or all elements, as disclosed herein, can be rigid, flexible, and/or any other combinations thereof. Any and/or all elements, as disclosed herein, can be identical to and/or different from each other in material, shape, size and/or any dimension, such as length, width, height, depth, area, volume, breadth, density, temperature, resistance and so forth.

Unless otherwise defined, all terms (including technical and scientific terms) used herein have the same meaning as commonly understood by one of ordinary skill in the art to which this disclosure belongs. The terms, such as those defined in commonly used dictionaries, should be interpreted as having a meaning that is consistent with their meaning in the context of the relevant art and should not be interpreted in an idealized and/or overly formal sense unless expressly so defined herein.

Furthermore, relative terms such as "below," "lower," "above," and "upper" may be used herein to describe one element's relationship to another element as illustrated in the accompanying drawings. Such relative terms are intended to encompass different orientations of illustrated technologies in addition to the orientation depicted in the accompanying drawings. For example, if a device in the accompanying drawings is turned over, then the elements described as being on the "lower" side of other elements would then be oriented on "upper" sides of the other elements. Similarly, if the device in one of the figures is turned over, elements described as "below" or "beneath" other elements would then be oriented "above" the other elements. Therefore, the example terms "below" and "lower" can encompass both an orientation of above and below.

As used herein, the term "about" and/or "substantially" refers to a +/−10% variation from the nominal value/term. Such variation is always included in any given value/term provided herein, whether or not such variation is specifically referred thereto.

U.S. Pat. No. 7,303,369 is herein fully incorporated by reference for all purposes. However, if any disclosures are incorporated herein by reference and such incorporated disclosures conflict in part and/or in whole with the present disclosure, then to the extent of conflict, and/or broader disclosure, and/or broader definition of terms, the present disclosure controls. In addition, if such incorporated disclosures conflict in part and/or in whole with one another, then to the extent of conflict, the later-dated disclosure controls.

FIG. **1**A illustrates an example mode of operation of a vertical axis wind turbine according to the present disclosure. Any element of a vertical axis wind turbine **100** can include metal, plastic or a lightweight composite material and be rustproof. Vertical axis wind turbine **100** includes a plurality of support arms **21**, **22**, a housing **23**, a generator and a plurality of blades **26**.

Arms **21**, **22** are coupled to each other via a coupling rod **29**. Coupling rod **29** is coupled via a bent rod **16** to a utility pole **10** above a plurality of power lines **11**, which are resting on a horizontal cross-arm **12** via an insulator **13**. Cross-arm **12** is supported by a support arm **25**. In another example embodiment, arms **21**, **22** are individually coupled to utility pole **10**. In yet another example embodiment, arms **21**, **22** are coupled in a V-shape, an L-shape, or an A-shape to utility pole **10**. In yet still another example embodiment, arms **21**, **22** are operative for coupling to a cell site, an antenna, a house roof, a transmission tower, a water tower, a lamppost, or a sign pole. In yet additional example embodiment, arms **21**, **22** can form and/or be included in a bracket.

Housing **23** is coupled to arms **21**, **22** via a plurality of caps **32**, **33** and a plurality of shafts **24**, **30**, which vertically extend through arms **21**, **22**. Housing **23** rotates on a vertical axis of rotation and with respect to arms **21**, **22**.

Housing **23** also includes an outer wall defining a space within housing **23**. The space is interior space and can be sealed to be waterproof and/or airtight. Although housing **23** is shown in a cylindrical shape, housing **23** can be of other shapes, such a sphere, a cube, a cuboid, a prism, a cone, a pyramid, and so forth.

A generator is stationed within the interior space. The generator generates an electric current in response to at least partial rotation of housing **23** and/or blades **26**. The electric current can include an alternating current (AC). However, in another example embodiment, the electric current can include a direct current (DC). Regardless, the generator is coupled to a distribution transformer **14** via a wire **18**, which conducts the generated electric current. The generator can include a generator shaft. Distribution transformer **14** is coupled to utility pole **10** via a plurality of bands **17**, which also couple a bent rod **16**. Bands **17** are adjustable via a plurality of adjusters **19**.

Blades **26** are coupled to an external surface of the outer wall of housing **23**. Blades **26** extend in a vertical direction, parallel to the external surface of housing **23**. Blades **26** are coupled to the external surface of housing **23** via a connector and a band extending around the outer wall of housing **23**. In another example embodiment, the band can rotate with respect to the generator and/or housing **23**.

Caps **32**, **33** are coupled to opposing sides/bases of housing **23**. Caps **32**, **33** can be stationary with respect to housing **23**. Although a portion of caps **32**, **33** is hemispherical, such as dome shaped, in general, caps **32**, **33** can be flat and/or rectangular and/or any other shape, such as a circle, a triangle and so forth. Each cap **32**, **33** includes a bearing. Housing **23** rotates around the bearings. Cap **33** includes an opening for wire **18**, which connects to power lines **11** via distribution transformer **14**, a coil **20** and a plurality of connecting wires **15**. The opening for wire **18** can include a grommet. Cap **32** is coupled to arm **21** via shaft **24** extending into a portion of cap **32**. Cap **33** is coupled to arm **22** via shaft **30** extending into a portion of cap **33**.

In another example embodiment, vertical wind turbine **100** can include a heater to generate a small amount of heat near bearings. For example, such generated heat can be used to keep the bearings from freezing. Such heater can be self-powered, such as via a battery, or powered via the generated current from turbine **100**.

FIG. **1**B illustrates another example mode of operation of a vertical axis wind turbine according to the present disclosure. Some elements of this figure are described above. Thus, same and/or similar reference characters identify same, and/or like components described above and any repetitive detailed description thereof will hereinafter be omitted or simplified in order to avoid complication.

Note that the opening for wire **18** is depicted via opening **27**, which can include a grommet. Also, note that the connector for blade **26** is depicted via a connector **31**, such as a bridge, like a bar, a shaft, and others. Resultantly, blades **26** are coupled to the external surface of housing **23** via connector **31** and the band extending around the outer wall of housing **23**.

A difference between FIGS. **1**A and **1**B is a placement of vertical axis wind turbine **100**. In FIG. **1**B, coupling rod **29** is coupled via bent rod **16** to utility pole **10** below power lines **11**. Thus, vertical axis wind turbine is positioned below power lines **11**.

In another example mode of operation, on utility pole **10**, at least one vertical axis wind turbine **100** is positioned below power lines **11** and at least one vertical axis wind turbine **100** is positioned above power lines **11**. For example, two opposing vertical axis wind turbines **100** can be positioned below power lines **11** and two opposing vertical axis wind turbines **100** can be positioned above power lines **11**. For another example, a plurality of adjacent vertical axis wind turbines **100** can be positioned below/above power lines **11** on one side of utility pole **10** and plurality of adjacent vertical axis wind turbines **100** can be positioned below/above power lines **11** on opposing vertically extending side of utility pole **10**. For yet another example, a plurality of vertical axis wind turbines **100** can be positioned on one side only. Note that any number of turbines **100** can be coupled to pole **10** in any combinatory manner.

FIGS. **2**A and **2**B illustrate a top view of an example embodiment of a vertical axis wind turbine in operation according to the present disclosure. Some elements of this figure are described above. Thus, same and/or similar reference characters identify same, and/or like components described above and any repetitive detailed description thereof will hereinafter be omitted or simplified in order to avoid complication.

Vertical axis wind turbine **100** is coupled to utility pole **10** via cap **32**, shaft **24** and arm **21**. Vertical axis wind turbine **100** rotates on a vertical axis in a direction D. As vertical axis wind turbine **100** rotates, an electric current is generated by the generator stationed within housing **23**. Note that blades **26** are below are **21**.

FIG. **3** illustrates an internal perspective view of an example embodiment of a vertical axis wind turbine according to the present disclosure. Some elements of this figure are described above. Thus, same and/or similar reference characters identify same, and/or like components described above and any repetitive detailed description thereof will hereinafter be omitted or simplified in order to avoid complication.

Note that the band around housing **23** is depicted as a band **28**, which can extend horizontally and/or diagonally in any manner. A central shaft **316** can extend from an external surface of cap **32** into a gear box **310**. Although central shaft **316** can rotate at a low speed and include a plurality of shaft-to-shaft stabilizing bearings **311**, in another example embodiment shaft **316** can also remain stationary. Central shaft **316** includes a first gear wheel mounted thereon. A generator **313** includes a generator shaft **312** with a second gearwheel mounted thereon, which can rotate at a high speed. The first gear wheel meshes with the second gear wheel in gear wheel box **310**. Although central shaft **316** and generator shaft **312** are parallel to each other, in another example embodiment, shaft **316** and shaft **312** are not parallel to each other. Generator shaft **312** extends from a base **314** mounted on a surface **315** of cap **33** through generator **313** into gear box **310**. Generator **313** can include a controller or at least one magnet. Thus, as housing **23** rotates, central shaft **316** rotates and thereby facilitates meshing of gear wheels within gear box **310**, which in turn power generator **313** to generate an electric current for conduction via wire **18** to distribution transformer **14**. Band **28** can rotate with respect to **313** generator and/or housing **23**. Note that at least one of shaft **316** and shaft **213** can be stationary with at least one of the first gear wheel and the second gear wheel rotating. In another example embodiment, at least one of arms **21**, **22**, housing **23**, caps **32**, **33**, connector **31**, band **28**, coupling rod **29**, shafts **24**, **30**, bent rod **16** and blades **26** includes non-conductive material, such as porcelain or composite polymer materials.

FIG. **4** illustrates a side view of an example embodiment of a vertical axis wind turbine according to the present disclosure. Some elements of this figure are described above. Thus, same and/or similar reference characters identify same, and/or like components described above and any repetitive detailed description thereof will hereinafter be omitted or simplified in order to avoid complication.

Cap **32** includes a bearing **420**. Cap **33** includes a bearing **410**. Using bearings **410**, **420**, housing **23** rotates on a vertical axis. In another example embodiment, bearings **410**, **420** are coupled to a heater to generate a small amount of heat near bearings **410**, **420** to keep bearings **410**, **420** from freezing.

Housing **23** has a housing roof **23**T and a housing sidewall. Housing roof **23**T is coupled to the housing sidewall. Blades **26** are secured to an external surface of the housing sidewall. Housing roof **23**T has a central opening **23**A through which central shaft **316** extends, but central shaft **316** is also coupled to housing roof **23**T via a connection hardware **317**. Central shaft **316** is stabilized by a connection to cap **32** via a shaft bearing **316**A.

Central shaft **316** includes a first gear wheel **430**. Generator shaft **312** includes a second gear wheel **440** meshing with first gear wheel **430** at a meshing point (MP). As central shaft **316** rotates with housing **23**, first gear wheel **430** meshes with second gear wheel **440** at MP and powers generator **312**. Generator shaft **312** is located in an offset position from a central axis of housing **23**. As previously noted, generator **312** is secured to base **314** of cap **33** with a lower bearing, which allows axial rotation of generator shaft **312**. However, note that at least a portion of shaft **312** can be co-axial to shaft **316**.

In another example embodiment, by incorporating vertical wind turbine **100**, as described herein, on already existing infrastructure, energy produced via turbine **100** can reduce a demand for energy from a power plant thereby efficiently creating and distributing renewable energy, decrease dependency on centralized electric energy generation, lessen fossil fuel use in electricity generation, minimize foreign energy dependence, reduce the price of electricity, create a new renewable energy business model, while implementing a job creating solution using an already existing infrastructure. Moreover, turbine **100** can produce electricity incrementally without overloading the electrical grid. Furthermore, by placing turbine **100** on top of utility poles **10**, whether above or below transmission lines **11**, more wind power can be captured.

FIG. **5** illustrates a perspective view of an example embodiment of a vertical axis wind turbine having a top vertical axis wind turbine according to the present disclosure. Some elements of this figure are described above. Thus, same and/or similar reference characters identify same, and/or like components described above and any repetitive detailed description thereof will hereinafter be omitted or simplified in order to avoid complication.

A wind turbine **200** is coupled to arms **21**, **22** via shafts **24**, **30**, which extend through arms **21**, **22**. Shafts **24**, **30** can rotate, and/or be fixed with respect to arms **21**, **22**. Housing **23** includes a top vertical axis wind turbine **32**, which replaces cap **32** as shown in FIGS. **1A-4**. Turbine **32** includes a base **32**.**1** and a plurality of foils **32**.**2** having a plurality of open spaces **32**.**3** in-between. Note that wire **18** can extend via shaft **24**. Note that turbine **32** can be coaxial with cap **33** or have different axis with respect to cap **33**. Turbine **100** and turbine **200** can be co-axial.

Base **32**.**1** can be of any shape, such as a parallelogram, a quadrilateral, an ellipse, a triangle, a polygon, a character, a symbol, and/or others in at least one dimension. Base **32**.**1** includes a plurality of magnetic transformers disposed around outer perimeter of base **32**.**1**.

Shaft **24** can be coupled to base **32**.**1**. Shaft **24** can also remain de-coupled with base **32**.**1**. Shaft **24** can also avoid contact with base **32**.**1**. Shaft **24** can extend through base **32**.**1**. Shaft **24** can also be coupled to shaft **316** for dependent wind capture. However, shaft **24** can also be de-coupled from shaft **316** for independent wind capture. Shaft **24** can be segmented. Shaft **24** can include a rotor mounted thereon, which can include a plurality of magnets disposed around outer perimeter of the rotor.

Base **32**.**1** can include a first magnet having a first polarity. The rotor can include a second magnet having a second polarity. The first magnet and the second magnet are positioned such that the first magnet and the second magnet are adjacent when axially aligned. The first polarity and the second polarity are such that the first magnet and the second magnet repel each other at least when installed as described herein and thereby enable levitation, such as floating and/or suspension, of the rotor above base **32**.**1**. In any combinatory manner, the magnets can be identical to and/or different from each other in number, material, shape, size and/or any dimension, such as length, width, height, depth, area, volume, breadth, density, temperature, resistance and so forth.

Foils **32**.**2** extend spirally/helically about shaft **24** with spaces **32**.**3** in-between, while coupled to shaft **24**. Foils **32**.**2** can extend in a rotating manner such that turbine **32** appears like an auger. Note that turbine **32** faces skyward, whether vertically or diagonally. In any combinatory manner, foils **32**.**2** can be identical to and/or different from each other in number, material, shape, size and/or any dimension, such as length, width, height, depth, area, volume, breadth, density, temperature, resistance and so forth. Foils **32**.**2** can be curved. Foils **32**.**2** are shaped to maximize wind energy capture irrespective of wind source, speed and/or direction. Foils **32**.**2** can be triangular of any type. Foils **32**.**2** can be linear, curvilinear and/or others. Foils **32**.**2** can be equally spaced apart and/or non-equally spaced apart in any manner.

The first magnet and the second magnet provide that the rotor and foils **32**.**2** levitate magnetically off base **32**.**1**. Such levitation reduces friction and enhances ease of rotation, which can allow for avoiding inclusion of at least one bearing. Turbine **32** can include an axial flux alternator using variable resistance coils, which can be individually and/or selectively turned on or off depending on wind conditions and electrical draw requirements. The coils can also be used to selectively produce mechanical drag for foil braking in high wind conditions and/or for maintenance. The alternator enables efficient energy generation at low rotational speed. The magnets can be shielded from external exposure, such as weather and/or animals. The first magnet and the second magnet can be segmented. Alternatively, the first magnet refers to a plurality of first magnets and the second magnet refers to a plurality of second magnets.

Foils **32**.**2** can include magnets positioned at their tips. Foils **32**.**2** are magnetically levitated, such as via floating, above base **32**.**1**, which can reduce friction, noise, vibration, energy loss and/or facilitate in more efficient energy generation. Alternatively, foils **32**.**2** are coupled to base **32**.**1**, but base **32**.**1** magnetically levitates above another base.

The alternator includes the magnetic transformers and at least one of the magnets. In any combinatory manner, the magnetic transformers can be identical to and/or different from each other in number, material, shape, size and/or any dimension, such as length, width, height, depth, area, volume, breadth, density, temperature, resistance and so forth. The magnetic transformers can include a cored coil and/or a coreless coil. The magnets can be passive magnets. The transformers generate electricity when the magnets are rotated past the transformers. In one example embodiment, turbine **32** can transmit the generated electricity via wiring of shaft **24**, such as within shaft **24**, and arm **21**, whether internal, external to and/or integral to arm **21**. In another example embodiment, turbine **32** can transmit the generated electricity via wiring to shaft **316** to generator **313** for output via wire **18**.

Turbine **32** can operate independent from blades **26** and/or depending on rotation of blades **26**. Turbine **32** avoids interfering with operation of other components of turbine **200**. Turbine **32** is relatively lightweight, quiet, heat/snow/ice/rain resistant and can be maintained in a minimal manner due to magnetic levitation of foils **32**.**2** since less or no bearings can be included.

FIG. **6** illustrates a perspective view of an example embodiment of a vertical axis wind turbine having a bottom vertical axis wind turbine according to the present disclosure. Some elements of this figure are described above. Thus, same and/or similar reference characters identify same, and/or like components described above and any repetitive detailed description thereof will hereinafter be omitted or simplified in order to avoid complication.

A turbine **300** is shown. A difference between FIGS. **5** and **6** is a placement of turbine **32**. In FIG. **6**, turbine **32** replaces cap **33** as shown in FIGS. **1-4***a*. Note that turbine **32** faces earth's surface, whether vertically or diagonally. Note that wire **18** can be extending along arm **21** instead of and/or in addition to arm **22**.

FIG. **7** illustrates a perspective view of an example embodiment of a vertical axis wind turbine having a plurality of vertical axis wind turbines according to the present disclosure. Some elements of this figure are described above. Thus, same and/or similar reference characters identify same, and/or like components described above and any repetitive detailed description thereof will hereinafter be omitted or simplified in order to avoid complication.

A turbine **400** is shown. A difference between FIGS. **6** and **7** is a placement of turbines **32**, **33**. In FIG. **7**, turbine **32** replaces cap **32** and turbine **33** replaces cap **33**, as shown in FIGS. **1**-**4***a*. Note that turbine **32** faces skyward, whether vertically or diagonally and turbine **33** faces earth's surface, whether vertically or diagonally. Also, note that turbines **32**, **33** can be coaxial to each other or have different axis with each other. Additionally, note how turbine **32** and turbine **33** can output the generated electricity. For example, turbine **32** can output via wiring of shaft **24**, such as within shaft **24**, and arm **21**, whether internal, external to and/or integral to arm **21** and/or output the generated electricity via wiring to shaft **316** to generator **313** for output via wire **18**. Wire **18** can also extend along arm **21** and be coupled to shaft **24**. Similarly, turbine **33** can output via wiring of shaft **30**, such as within shaft **30**, and arm **22**, whether internal, external to and/or integral to arm **22** and/or output the generated electricity via wiring of shaft **316**.

FIG. **8** illustrates a perspective view of an example embodiment of a vertical axis wind turbine having an inverted top vertical axis wind turbine according to the present disclosure. Some elements of this figure are described above. Thus, same and/or similar reference characters identify same, and/or like components described above and any repetitive detailed description thereof will hereinafter be omitted or simplified in order to avoid complication.

A turbine **500** is shown. A difference between FIGS. **5**-**7** and **8** is a placement of turbine **32**. In FIG. **8**, turbine **32** replaces cap **32**, as shown in FIGS. **1**-**4***a*. Note that turbine **32** is inverted and faces earth's surface, whether vertically or diagonally. Also, note that turbine **32** and cap **33** can be coaxial to each other or have different axis with respect to each other. Additionally, note how turbine **32** can output the generated electricity. For example, turbine **32** can output via wiring of shaft **24**, such as within shaft **24** whether toward generator **312** or toward arm **21**, whether internal, external to and/or integral to arm **21**. Wire **18** can also extend along arm **21** and be coupled to shaft **24**. Note that another turbine **32**, whether facing skyward or earthward, can be coupled to shown turbine **32** such that bases **32**.**1** of turbines **32** at least partially overlap each other and the another turbine **32** is more proximal to arm **21** than shown turbine **32** such that the shown turbine **32** is intermediate with respect to housing **23** and the another turbine **32**. Such combination can be performed with any embodiments disclosed herein in any combinatory manner.

FIG. **9** illustrates a perspective view of an example embodiment of a vertical axis wind turbine having an inverted bottom vertical axis wind turbine according to the present disclosure. Some elements of this figure are described above. Thus, same and/or similar reference characters identify same, and/or like components described above and any repetitive detailed description thereof will hereinafter be omitted or simplified in order to avoid complication.

A turbine **600** is shown. A difference between FIGS. **5**-**8** and **9** is a placement of turbine **32**. In FIG. **9**, turbine **32** replaces cap **32**, as shown in FIGS. **1**-**4***a*. Note that turbine **32** is inverted and faces skyward, whether vertically or diagonally. Also, note that turbine **32** and cap **33** can be coaxial to each other or have different axis with respect to each other. Additionally, note how turbine **32** can output the generated electricity. For example, turbine **32** can output via wiring of shaft **24**, such as within shaft **24** whether toward generator **312** or toward arm **21**, whether internal, external to and/or integral to arm **21**. Wire **18** can also extend along arm **21** and be coupled to shaft **24**. Note that another turbine **32**, whether facing skyward or earthward, can be coupled to shown turbine **32** such that bases **32**.**1** of turbines **32** at least partially overlap each other and the another turbine **32** is more proximal to arm **21** than shown turbine **32** such that the shown turbine **32** is intermediate with respect to housing **23** and the another turbine **32**. Such combination can be performed with any embodiments disclosed herein in any combinatory manner.

Note that any number of turbines **32**, **33** whether facing skyward or earthward in any combinatory manner, can be coupled to housing **23**, whether above housing **23** and/or below housing **23** in any combinatory manner. For example, any number of turbines **32**, **33** can be stacked one above another whether below and/or above housing **23** in any combinatory manner or positioned horizontally adjacent to each other whether below and/or above housing **23** in any combinatory manner. Also, note that any number of caps **32**, **33**, whether facing skyward or earthward in any combinatory manner, can be used, such as in-between turbines **32**, **33**. Also note any number of turbines **32**, **33** can be placed in-between housing **23** and caps **32**, **33**, whether facing skyward or earthward in any combinatory manner.

FIG. **10** illustrates a perspective view of an example embodiment of a vertical axis wind turbine having a top vertical axis wind turbine coupled to a utility pole according to the present disclosure. Some elements of this figure are described above. Thus, same and/or similar reference characters identify same, and/or like components described above and any repetitive detailed description thereof will hereinafter be omitted or simplified in order to avoid complication.

Turbine **200** is coupled to pole **10** and generates electricity as described herein.

FIG. **11** illustrates an example mode of operation of a vertical axis wind turbine according to the present disclosure. Some elements of this figure are described above. Thus, same and/or similar reference characters identify same, and/or like components described above and any repetitive detailed description thereof will hereinafter be omitted or simplified in order to avoid complication.

A building **700** has a sidewall **702** and a roof **704**. Turbine **100** is coupled via rod **29** to sidewall **702**. Rod **29** includes and/or is coupled to a bracket **34**. Bracket **34** is coupled to sidewall **702** via a plurality of fasteners **36**. Note that bracket **34** and fasteners **36** accommodate for wire **18**. Note that turbine **100** can also be coupled to roof **704**. Note that if rain flows from roof **704**, turbine **100** can still generate electricity. Note that any turbines disclosed herein can be coupled to building **700** in any combinatory manner. Note that although sidewall **702** includes vinyl siding, any type of siding can be used.

FIG. **12** illustrates an example mode of operation of a vertical axis wind turbine according to the present disclosure. Some elements of this figure are described above. Thus, same and/or similar reference characters identify same, and/or like components described above and any repetitive detailed description thereof will hereinafter be omitted or simplified in order to avoid complication.

A building **800** includes a sidewall **802**. Turbine **100** is coupled to sidewall **802** via rod **29**, bracket **34**, and fasteners **36**. Note that bracket **34** and fasteners **36** accommodate for wire **18**. Note that turbine **100** can also be coupled to roof of building **800**. Note that if rain flows from such roof, turbine **100** can still generate electricity. Note that any turbines disclosed herein can be coupled to building **800** in any combinatory manner. Note that although sidewall **802** includes bricks, any type of wall building material can be used.

FIG. **13** illustrates a perspective view of an example embodiment of a vertical axis wind turbine equipped with an array of photovoltaic cells according to the present disclosure. Some elements of this figure are described above. Thus, same and/or similar reference characters identify same, and/or like components described above and any repetitive detailed description thereof will hereinafter be omitted or simplified in order to avoid complication.

Turbine **100** includes a pair of bands **35** extending around housing **23**. Bands **35** are identical to each other in any manner, such as in shape, weight, size, material, orientation, and other properties. However, in other embodiments, bands **35** are different from each other in any manner, such as shape, weight, size, material, orientation, and other properties. Bands **35** extend parallel to each other, but in other embodiments extend non-parallel to each other. Bands **35** are unitary, but in other embodiments are assemblies. Bands **35** are shaped uniformly, but in other embodiments are shaped in non-uniformly, such as for weight reduction, for example with bands **35** width narrowing between connectors **31**. Bands **35** are secured to housing **23**, such as through assembly with housing **23** via tension, pressure, mounting, adhesion, fastening, mating, magnetizing, and others. However, in other embodiments, bands **35** are unitary with housing **23**. Resultantly, bands **35** move along with housing **23** when housing **23** rotates on a vertical axis with respect to cap **32** and cap **33**. However, in other embodiments, bands **35** rotate on a vertical axis with respect to housing **23**, such as when housing **23** is stationary and/or housing **23** also rotating with respect to cap **32** and cap **33**. Such rotations can be clockwise and/or counterclockwise. In some embodiments, turbine **100** includes one band **35**. In other embodiments, turbine **100** includes at least three bands **35**. In yet other embodiments, turbine **100** lacks any bands **35**, such as shown in FIG. **4**.

Blades **26** are coupled to bands **35** via connectors **31**. However, in other embodiments, bands **35** are lacking and blades **26** are connected to housing **23** via connectors **31**, such as shown in FIG. **4**. At least one of blades **26** includes an outer side **26.1**, an inner side **26.2**, and a set of intermediates side **26.3** spanning between side **26.1** and side **26.2**, whether horizontally and/or vertically. Side **26.1** is unitary, but in other embodiments is an assembly. Side **26.2** is unitary, but in other embodiments is an assembly. Sides **26.3** are unitary, but in other embodiments are assemblies. Note that at least two of sides **26.3** are identical to each other in any manner, such as size, shape, material, orientation, weight, but can be different from each other, such as size, shape, material, orientation, weight.

Side **26.1** includes an array **26.4** of photovoltaic cells **26.5**, such as solar cells. Array **26.4** is rectangular, but in other embodiments, array **26.4** is square. Note that at least two arrays **26.4** are also possible, which can be identical to and/or different from each other in any manner. Further, note that array **26.4** is curved and projects away from housing **23**. However, in other embodiments, array **26.4** is non-curved. Array **26.4** is embedded into blade **26**. However, in other embodiments, array **26.4** is securely stationed on blade **26**, such as via tension, pressure, mounting, adhesion, fastening, mating, magnetizing, and others.

Cells **26.5** are identical to each other in any manner, such as in size, shape, material, orientation, weight, electricity generation, and others, but can be different from each other in any manner, such as size, shape, material, orientation, weight, electricity generation, and others. Cells **26.5** are operative to receive light energy and convert the received light energy into electricity, such as electric current, via a photovoltaic effect. For example, the light energy is via at least one of solar energy, lunar energy, street lamppost energy, vehicle lamp energy, and flashlight energy. The electricity is guided from array **26.4** via electrically conductive wiring/contacts/hardware, such as cables, inverters, and others, operably extending through one of blades **26**, at least one of connectors **31**, housing **23**, and cap **33**, to wire **18**. Therefore, turbine **100** generates electricity in at least one of a mechanical manner, such as via rotating of blades **26** via wind energy, and a photovoltaic manner, such as via array **26.4** through light energy. Such capability can improve electricity generation, such as during windy conditions on a sunny day when turbine **100** can generate electricity in the mechanical manner and the photovoltaic manner simultaneously.

Note that at least one of blades **26** can include at least one cell **26.5** anywhere thereon. For example, side **26.2** can include at least one cell **26.5** and/or at least one of sides **26.3** can include at least one cell **26.5**. In still other embodiments, at least one of connectors **31** includes at least one cell **26.5**. In further embodiments, at least one of bands **35** includes at least one cell **26.5**. In yet other embodiments, housing **23** includes at least one cell **26.5**. Such inclusion can be between bands **35**, and/or between caps **32**, **33** and bands **35**. Cell **26.5** can be shaped in any way and/or arranged with other cells **26.5** in any manner. In yet still other embodiments, at least one of cap **32** and cap **33** includes at least one cell **26.5**. Such inclusion allows for cell **26**. to be shaped in any way and/or arranged with other cells **26.5** in any manner.

FIG. **14**A illustrates a frontal view of an example embodiment of a photovoltaic cell on a vertical axis wind turbine blade according to the present disclosure. Some elements of this figure are described above. Thus, same and/or similar reference characters identify same, and/or like components described above and any repetitive detailed description thereof will hereinafter be omitted or simplified in order to avoid complication.

Blade **26** includes cell **26.5**, which is shaped as a rectangle. However, note that in other embodiments, cell **26.5** is shaped differently, such as a triangle, an oval, a square, a trapezoid, a pentagon, an octagon, and others. Note that blade **26** can be shaped differently as well, such as a square, a circle, a triangle, a pentagon, an octagon, a trapezoid, and others.

FIG. **14**B illustrates a frontal view of an example embodiment of a photovoltaic cell array on a vertical axis wind turbine blade according to the present disclosure. Some elements of this figure are described above. Thus, same and/or similar reference characters identify same, and/or like components described above and any repetitive detailed description thereof will hereinafter be omitted or simplified in order to avoid complication.

Blade **26** includes array **26.4** containing cells **26.5**. Note that corner cells **26.5** are curved, but in other embodiments, the corner cells **26.5** are acute. Further, note that non-corner cells **26.5**. are square shaped, but in other embodiments, non-corner cells **26.5** are shaped differently, such as a triangle, an oval, a rectangle, a trapezoid, a pentagon, an octagon, and others.

FIG. **14**C illustrates a frontal view of another example embodiment of a photovoltaic cell array on a vertical axis wind turbine blade according to the present disclosure. Some elements of this figure are described above. Thus, same and/or similar reference characters identify same, and/or like components described above and any repetitive detailed description thereof will hereinafter be omitted or simplified in order to avoid complication.

Blade **26** includes array **26.4** containing cells **26.5**. Note that cells **26.5** are circular, but in other embodiments, are shaped differently, such as a triangle, an oval, a rectangle, a square, a trapezoid, a pentagon, an octagon, and others. Note that empty spaces between cells **26.5** provide at least visual access to side **26.1** of blade **26**. However, also note that in other embodiments, blade **26** is defined via array **26.4**. For example, the empty spaces provide at least visual access to housing **23**.

FIG. **14**D illustrates a frontal view of an example embodiment of a photovoltaic cell enclosed via a set of photovoltaic cells arranged in a rectangular pattern on a vertical axis wind turbine blade according to the present disclosure. Some elements of this figure are described above. Thus, same and/or similar reference characters identify same, and/or like components described above and any repetitive detailed description thereof will hereinafter be omitted or simplified in order to avoid complication.

Cell **26.5** is enclosed via a set of cells **26.5** arranged in a rectangular pattern. However, note that the set of cells **26.5** is arranged in another pattern, such as a square, an ellipse, a pentagon, an octagon, a triangle, and others.

FIG. **14**E illustrates a frontal view of an example embodiment of a set of photovoltaic cells arranged in a numerically alternating pattern on a vertical axis wind turbine blade according to the present disclosure. Some elements of this figure are described above. Thus, same and/or similar reference characters identify same, and/or like components described above and any repetitive detailed description thereof will hereinafter be omitted or simplified in order to avoid complication.

The set of cells **26.5** is arranged in a numerically alternating pattern. Note that such number can alternate in any manner. Each of cells **26.5** is circular, but can be shaped differently, such as described herein.

FIG. **14**F illustrates a frontal view of another example embodiment of a set of photovoltaic cells arranged in a numerically alternating pattern on a vertical axis wind turbine blade according to the present disclosure. Some elements of this figure are described above. Thus, same and/or similar reference characters identify same, and/or like components described above and any repetitive detailed description thereof will hereinafter be omitted or simplified in order to avoid complication.

The set of cells **26.5** is arranged in a numerically alternating pattern. Note that such number can alternate in any manner. Each of cells **26.5** is square, but can be shaped differently, such as described herein.

Although FIGS. **14**A-**14**F are described with reference to blade **26**, note that, in other embodiments, any one of such configurations and/or combinations thereof are used on at least one of other elements of turbine **100**, such as at least one of at least one connector **31**, at least one blade **35**, housing **23**, cap **32** and cap **33**. Note that other portions of setup described herein can also include at least one cell **26.5**, such as arms **21**.

FIG. **15**A illustrates a perspective view of an example embodiment of a first vertical axis wind turbine coupled to a second vertical axis wind turbine with a plurality of sequential photovoltaic foils according to the present disclosure. Some elements of this figure are described above. Thus, same and/or similar reference characters identify same, and/or like components described above and any repetitive detailed description thereof will hereinafter be omitted or simplified in order to avoid complication.

Turbine **200** includes foils **32.2**. Each of foils **32.2** includes at least one photovoltaic cell **32.4**, as described herein. Note that cells **32.4** are identical to each other in any manner, such as in size, shape, material, orientation, weight, electricity generation, and others, but can be different from each other in any manner, such as size, shape, material, orientation, weight, electricity generation, and others. Cells **32.4** are operative to receive light energy and convert the received light energy into electricity, such as electric current, via a photovoltaic effect. For example, the light energy is via at least one of solar energy, lunar energy, street lamppost energy, vehicle lamp energy, and flashlight energy. The electricity is guided from cells **32.4** via electrically conductive wiring/contacts/hardware, such as cables, inverters, and others, operably extending through foils **32.2**, housing **23**, and cap **33**, to wire **18**. Therefore, turbine **200** generates electricity in at least one of a mechanical manner, such as via rotating of at least one of blades **26** and foils **32.2** via wind energy, and a photovoltaic manner, such as via cells **32.4** through light energy. Such capability can improve electricity generation, such as during windy conditions on a sunny day when turbine **200** can generate electricity in the mechanical manner and the photovoltaic manner simultaneously. Note that at least one of foils **32.2** can include at least one cell **32.4** anywhere thereon in any pattern, such as located on a single side of one of foils **32.2**, both sides of one of foils **32.2**, and others.

FIG. **15**B illustrates a perspective view of an example embodiment of a first vertical axis wind turbine coupled to a second vertical axis wind turbine with a plurality of alternating photovoltaic foils according to the present disclosure. Some elements of this figure are described above. Thus, same and/or similar reference characters identify same, and/or like components described above and any repetitive detailed description thereof will hereinafter be omitted or simplified in order to avoid complication.

Turbine **200** includes foils **32.2**. Less than each of foils **32.2** includes at least one photovoltaic cell **32.4**. As shown, a placement of cells **32.4** alternates between foils **32.2**. Note that such alternation is one example and other types of alternation/patterns are possible, such as every other two foils **32.2**. Note that cells **32.4** are identical to each other in any manner, such as size, shape, material, orientation, weight, electricity generation, and others, but can be different from each other in any manner, such as size, shape, material, orientation, weight, electricity generation, and others.

FIG. **16** illustrates a perspective of an example embodiment of a vertical axis wind turbine containing a power storage device for storing generated energy according to the present disclosure. Some elements of this figure are described above. Thus, same and/or similar reference characters identify same, and/or like components described above and any repetitive detailed description thereof will hereinafter be omitted or simplified in order to avoid complication.

Cap **33** contains a power storage device, such as a rechargeable battery **318**. However, note that in other embodiments, the power storage device can be located in other portions of turbine **100**, such as cap **32**, housing **23**, and others. Also, note that in other embodiments, the power storage device includes a capacitor.

Battery **318**, such as a lead-acid battery, a nickel cadmium (NiCd) battery, a nickel metal hydride (NiMH) battery, a lithium ion (Li-ion) battery, a lithium ion polymer (Li-ion polymer) battery, and others. Battery **318** is configured for storage of electrical energy, as generated via at least one of the mechanical manner, such as via at least one of blades **26** and foils **32.2**, and the photovoltaic manner, such as via at least one cells **26.5** and cells **32.4**. Housing **23** contains an inverter, which can also be located in other portions of turbine **100**. Battery **318** is operably downstream from the inverter. Battery **318** is operably connected to wire **18**.

When turbine **100** is stationed on a lamppost, then battery **318** can be configured to provide power for nighttime lighting of the lamppost. Further, when turbine **100** is placed on a utility pole, then battery **318** can be configured to provide power for nighttime lighting of the pole. In addition, other types of lighting can be powered via battery **318**, such as traffic lights, aircraft warning lights, and others. However, note that battery **318** can provide power to other electrical equipment operably coupled with turbine **100**, such as a residential/commercial/industrial lighting unit, a cellular base station, a radar unit, a camera unit, and others. Such power provision is at least one of manual and automatic. Also, note that battery **318** can be provide power to the heater, as described herein.

FIG. **17**A illustrates a schematic view of an example embodiment of a photovoltaic current conduction system according to the present disclosure. Some elements of this figure are described above. Thus, same and/or similar reference characters identify same, and/or like components described above and any repetitive detailed description thereof will hereinafter be omitted or simplified in order to avoid complication.

Turbine **100** includes a plate **320** housed within housing **23**. Plate **320** is circularly ring shaped to accommodate for positioning of generator **313**, as shown in FIG. **3**. However, in other embodiments, plate **320** is shaped differently, such as a flat and solid surface. Plate **320** contains a peripheral outer edge equipped with a first electrode **322**, which extends circularly along the edge. Electrode **322** is electrically connected to wire **18**, whether directly and/or indirectly. Note that other relevant electrical equipment can be electrically connected to wire **18** downstream from electrode **322** prior to wire **18** exiting cap **33**. Note that in other embodiments, plate **320** is lacking and electrode **322** is ring shaped.

Housing **23** contains a second electrode **324** extending from and/or within the housing sidewall. Turbine **100** includes a bridging wire **326** electrically connected to array **26.4** and electrode **324**. Note that other relevant electrical equipment, such as an inverter, can be electrically connected to wire **326** upstream to electrode **326** and downstream from array **26.4**. Electrode **324** conductively contacts electrode **326**.

As array **26.4** receives light energy, while at least one of blade **26** and housing **23** rotate with respect to cap **32** and cap **33**, electric current is conducted from array **26.4** via wire **326**, electrode **324**, and electrode **322** to wire **18**, as electrode **324** circularly travels about electrode **322** and contacts electrode **322**. Additionally, note that battery **318** can be operably connected to wire **18**. Note that turbine **100**, as other turbines disclosed herein, is configured to minimize risk of electric fire, sparks, and other dangers during electric current conduction. In addition, note that electrode **324** and electrode **322** are configured for smooth electrical contact therebetween. Such smooth contact can minimize friction between electrode **324** and electrode **322** and maximize rotation of at least one of blade **26** and housing **23**. Note that electrode **324** can be wheeled.

FIG. **17**B illustrates a schematic view of another example embodiment of a photovoltaic current conduction system according to the present disclosure. Some elements of this figure are described above. Thus, same and/or similar reference characters identify same, and/or like components described above and any repetitive detailed description thereof will hereinafter be omitted or simplified in order to avoid complication.

Turbine **200** includes base **32.1** and a rotor **32**R. Rotor **32**R contains foils **32.2** equipped with cells **32.4**. Via wind energy, rotor **32**R rotates with respect to base **32.1** on a vertical axis based at least in part on magnetic levitation, as disclosed herein. Rotor **32**R contains a bridging wire **32.5** having a first contact, which can be an end contact, and a second contact, which can be an end contact. The first contact is configured for receiving current generated via cells **32.4**. The second contact includes a first electrode **32.6**. Note that rotor **32**R can contain other relevant electrical equipment, such as an inverter, electrically connected to wire **32.5** downstream from cells **32.4** and upstream from electrode **32.6**.

Base **32.1** includes a second electrode **32.7** electrically connected to wire **18**, whether directly and/or indirectly. Electrode **32.7** is circular to accommodate for rotation of electrode **32.6** via rotor **32**R. However, in other embodiments, electrode **32.7** is shaped differently, such as a crescent. Note that other relevant electric equipment can be electrically connected to wire **18** downstream from electrode **32.7** and upstream prior to wire **18** exiting arm **21**.

As cells **32.4** receive light energy, while rotor **32**R rotates with respect to base **32.1**, electric current is conducted from cells **32.4** via wire **32.5**, electrode **32.6**, and electrode **32.7** to wire **18**, as electrode **32.6** circularly travels about electrode **32.7** and contacts electrode **32.7**. Note that battery **318** can be operably connected to wire **18**. Further, note that turbine **200**, as other turbines disclosed herein, is configured to minimize risk of electric fire, sparks, and other dangers during electric current conduction. In addition, note that electrode **32.6** and electrode **32.7** are configured for smooth electrical contact therebetween. Such smooth contact can minimize friction between electrode **32.6** and electrode **32.7** and maximize rotation of rotor **32**R with respect to base **32.1**. Note that electrode **32.6** can be wheeled.

FIG. **17**C illustrates a schematic view of yet another example embodiment of a photovoltaic current conduction system according to the present disclosure. Some elements of this figure are described above. Thus, same and/or similar reference characters identify same, and/or like components described above and any repetitive detailed description thereof will hereinafter be omitted or simplified in order to avoid complication.

Turbine **200** illustrates system of FIG. **17**A and FIG. **17**B. Wire **18** includes a wire **18.1** and a wire **18.2**. Wire **18.1** is electrically connected to electrode **32.7**, which receives electric current from electrode **32.6**, and wire **32.5**, as generated via cells **32.4**. Wire **18.2** is electrically connected to electrode **322**, which receives electric current from electrode **324** and wire **326**, as generated via cells **26.4**.

FIG. **18** illustrates a schematic view of still another example embodiment of a photovoltaic current conduction system according to the present disclosure. Some elements of this figure are described above. Thus, same and/or similar reference characters identify same, and/or like components described above and any repetitive detailed description thereof will hereinafter be omitted or simplified in order to avoid complication.

Turbine **100** includes an arm **328** and a leg **330**. Arm **328** and leg **330** extend from each other an L-shaped manner. However, note that arm **328** and leg **330** can extend from each other in a non-L-shaped manner as well, such as in a first range between about 90 degrees and about 170 degrees, a second range between about 20 degrees and about 90 degrees, and others. Arm **328** and leg **330** are unitary to each other, but in other embodiments are assembled to each other. Arm **328** and leg **330** are housed within housing **23**. Leg **330** includes electrode **324**. Plate **320** includes electrode **322**, which is circularly shaped. Arm **328** is fixedly coupled to the housing sidewall in an L-shaped manner. However, other coupling orientations are possible, such as at a larger angle from leg **330**, for example about 130 degrees from leg **330**. Arm **328** and leg **330** host wiring, which electrically connects electrode **324** to cells **26.4** on blade **26**. Such wiring is operably connected to wire **326** extending along connector **31**. Also, note that such wiring extends through the housing sidewall between arm **328** and wire **326**.

As array **26.4** receives light energy, while at least one of blade **26** and housing **23**, along with arm **328**, leg **330**, and electrode **324**, rotate with respect to cap **33**, electric current is conducted from array **26.4** via wire **326**, through the wiring in the housing sidewall, along arm **328**, leg **330**, electrode **324**, and electrode **322** to wire **18**, as electrode **324** circularly travels about electrode **322** and contacts electrode **322**. Note that other relevant electrical equipment, such as an inverter, can be electrically connected to and/or along at least one of the wiring in the sidewall, wire **326**, arm **328**, and leg **330**.

The present disclosure has been presented for purposes of illustration and description via example, but is not intended to be exhaustive or limited to the disclosure in the form disclosed. Many modifications and variations in techniques and structures are apparent to those of ordinary skill in the art without departing from the scope and spirit of the disclosure as set forth in the claims that follow. Accordingly, such modifications and variations are contemplated as being a part of the present disclosure. The scope of the present disclosure is defined by the claims, which includes known equivalents and unforeseeable equivalents at the time of filing of this application.

What is claimed is:

1. A system comprising: a vertical axis wind turbine comprising a plurality of support arms, a housing coupled to said arms, a bridging connector having a first end portion and a second end portion, a blade coupled to said second end portion, and an electric generator housed within said housing,

wherein said first end portion coupled to said housing, said blade vertically extending along said housing, said generator operative based at least in part on said housing vertically rotating between said arms via said blade.

2. The system of claim **1**, wherein said turbine further comprising an another bridging connector having an another first end portion and an another second end portion, said another first portion coupled to said housing, said blade coupled to said another second portion.

3. The system of claim **1**, wherein said turbine further comprising an another bridging connector having an another first end portion and an another second end portion, and an another blade coupled to said another second portion, said another first portion coupled to said housing, said another blade vertically extending along said housing.

4. The system of claim **1**, wherein said turbine further comprising a bearing and a cap including said bearing, said cap coupled to one of said arms and said housing such that said cap is therebetween, said housing configured to rotate with respect to said cap based at least in part on said bearing.

5. The system of claim **1**, wherein said turbine further comprising a photovoltaic cell, at least one of said housing and said blade including said cell.

6. The system of claim **5**, wherein said turbine further comprising a power storage device configured for storing energy from at least one of said generator and said cell.

7. The system of claim **1**, further comprising:

an another vertical axis wind turbine coupled to one of said arms and said housing such that said another turbine is therebetween, said another turbine including a base and a rotor, said base including a first magnet, said rotor including a second magnet, said rotor including a plurality of vertically spiraling foils, said rotor positioned adjacent to said base such that said first magnet is disposed adjacent to said second magnet thereby causing said rotor to be rotatingly suspended above said base, said rotor configured for vertical axis rotation independent of said blade.

8. The system of claim **7**, wherein at least one of said foils includes at least one photovoltaic cell.

9. The system of claim **7**, wherein said blade and at least one of said foils are shaped differently.

10. The system of claim **9**, wherein said foils spiral in a direction away from said housing toward said one of said arms.

11. The system of claim **9**, wherein said foils spiral in a direction away from said one of said arms toward said housing.

12. A system comprising:

a vertical axis wind turbine comprising a plurality of support arms, a housing coupled to said arms, a band extending around said housing, a blade coupled to said band, and an electric generator housed within said housing,

wherein said generator operative based at least in part on said band and said blade vertically rotating between said arms,

wherein at least one of said housing, said band, and said blade including a photovoltaic cell.

13. The system of claim **12**, wherein said turbine further comprising an another blade coupled to said band, said another blade operative for vertical rotation between said arms, at least one of said blade and said another blade vertically extending along said housing, said another blade including an another photovoltaic cell.

14. The system of claim **12**, wherein said turbine further comprising an another band extending around said housing, said blade coupled to said another band, said another band including an another photovoltaic cell.

15. The system of claim **12**, wherein said housing is configured to vertically rotate with said band and said blade.

16. The system of claim **12**, further comprising an another vertical axis wind turbine coupled to one of said arms and said housing such that said another turbine is therebetween, said another turbine including a base and a rotor, said base including a first magnet, said rotor including a second magnet, said rotor including a plurality of vertically spiraling foils, said rotor is positioned adjacent to said base such that said first magnet is disposed adjacent to said second magnet thereby causing said rotor to be rotatingly suspended above said base, said rotor configured for vertical axis rotation independent of said blade, at least one of said foils including at least one photovoltaic cell.

17. A system comprising:

a vertical axis wind turbine comprising a base and a rotor, said base including a first magnet and a first electrode, said rotor including a second magnet and a second electrode, said rotor including a plurality of vertically spiraling foils, said rotor positioned adjacent to said base such that said first magnet is disposed adjacent to said second magnet thereby causing said rotor to be rotatingly suspended above said base, at least one of said foils includes at least one photovoltaic cell, said first electrode receiving energy from said at least one cell via said second electrode traveling along said first electrode via said rotor; and

an another vertical axis wind turbine comprising a plurality of support arms, a housing coupled to said arms, a bridging connector having a first end portion and a second end portion, a blade coupled to said second end portion, and an electric generator housed within said housing, wherein said first portion coupled to said housing, said blade vertically extending along said housing, said generator operative based at least in part on said housing vertically rotating between said arms via said blade, said blade rotating independent of said rotor, wherein said turbine is coupled to one of said arms and said housing such that said turbine is therebetween.

18. The system of claim **17**, wherein said another turbine further comprising at least one another photovoltaic cell, at least one of said housing and said blade including said another cell.

19. The system of claim **18**, wherein said another turbine further comprising a power storage device configured for storing energy from at least one of said generator, said cell, and said another cell.

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